Department of Biological Sciences
California State University
Hayward, California **94542** **(510) 885-3471** FAX (510) 885-4747

5/14/00

CALFED Bay/Delta Program Office
1416 Ninth St. Suite 1155
Sacramento CA 95814

Dear Colleagues,

Thank you again for your assistance with Delta restoration. Here is the original plus the 10 official, university etc.-approved copies of our Phase 2 proposal:
Biological Restoration Improvements and Monitoring in the Suisun Marsh/North San Francisco Bay Ecological Zone. Phase 2: Importance of ponds and other features along Marsh Channels.
-by CSUH, Contra Costa Mosquito and Vector Control, and US F&W Service San Pablo Bay National Wildlife Refuge.

We prepared the package according to your recent, instructive PSP and associated meeting.

All the required threshold requirements (aside from cover sheet, first): Notification cover letterss, Environmental Compliance Checklists, Land Use Checklist, and Contract form (state) are near the end of the package.

Thank you for making all this possible. Feel free to contact me for any further information that may be helpful to you.

Best wishes for the review process.

sincerely,

Chris Kitting

Christopher L. Kitting, Ph.D.
Professor, P.I.
ckitting@csuhayward.edu

Attachment H

Proposal # 2001- E215 (Office Use Only)

PSP Cover Sheet (Attach to the front of each proposal)

Proposal Title: BIOLOGICAL RESTORATION IMPROVEMENTS AND MONITORING: PHASE 2: PONDS ALONG CHANNELS

Applicant Name: CALIFORNIA STATE U. HAYWARD and CC Mosq &Vector Cntrl, and US F&W S SPBNWR

Contact Name: Dr. Chris Kitting

Mailing Address: Dept. Biological Sciences, Calif. State Univ. Hayward, CA 94542

Telephone: (510) 885-3001

Fax: (510) 885-4747

Email: ckitting@csuhayward.edu

Amount of funding requested: $ 1,491,835

Some entities charge different costs dependent on the source of the funds. If it is different for state or federal funds list below.

State cost _____ Federal cost _____

Cost share partners? X **Yes** ____ **No**

Identify partners and amount contributed by each Cal State U Hayward ($ 328,502 +partial indirect costs)
Contra Costa Mosquito &Vector Cntrl ($140,000) SP Bay Nat Wldlf Rfg ($2730)

Indicate the Topic for which you are applying (check only one box).

- ☐ Natural Flow Regimes
- ☐ Nonnative Invasive Species
- ☐ Channel Dynamics/Sediment Transport
- ☐ Flood Management
- ☒ Shallow Water Tidal/ Marsh Habitat
- ☐ Contaminants
- ☐ Beyond the Riparian Corridor
- ☐ Local Watershed Stewardship
- ☐ Environmental Education
- ☐ Special Status Species Surveys and Studies
- ☐ Fishery Monitoring, Assessment and Research
- ☐ Fish Screens

What county or counties is the project located in? Sonoma County (Tubbs Is.) Contra Costa Co. (other sites)

What CALFED ecozone is the project located in? See attached list and indicate number. Be as specific as possible CALFED Zone 2: San Pablo Bay (zone 2.5). Suisun Bay Marsh (zone 2.1) +border West Delta (zone 1.4)ref.

Indicate the type of applicant (check only one box):

- ☒ State agency -State University
- ☐ Public/Non-profit joint venture
- ☐ Local government/district
- ☐ University (private?)
- ☐ Other: _____
- ☐ Federal agency
- ☐ Non-profit
- ☐ Tribes
- ☐ Private party

Indicate the primary species which the proposal addresses (check all that apply):

- [X] San Joaquin and East-side Delta tributaries fall-run chinook salmon
- [X] Winter-run chinook salmon
- [X] Spring-run chinook salmon
- [X] Late-fall run chinook salmon
- [X] Fall-run chinook salmon
- [X] Delta smelt
- [X] Longfin smelt
- [X] Splittail
- [ ] Steelhead trout
- [X] Green sturgeon
- [X] Striped bass
- [X] White Sturgeon
- [X] All chinook species
- [X] Waterfowl and Shorebirds
- [ ] All anadromous salmonids
- [X] Migratory birds
- [ ] American shad
- [ ] Other listed T/E species: _____

Indicate the type of project (check only one box):

- [ ] Research/Monitoring
- [ ] Watershed Planning
- [ ] Pilot/Demo Project
- [ ] Education
- [X] Full-scale Implementation

Is this a next-phase of an ongoing project? Yes [X] No [ ]

Have you received funding from CALFED before? Yes [X] No [ ] (present phase 1 only)

If yes, list project title and CALFED number Biological Restoration and Monitoring in the Suisun Marsh/ N SF Bay Zone: An Ecosystem Approach., Proposal #98-C1042

Have you received funding from CVPIA before? Yes [ ] No [X] US FWS Coop Aggreement # 114209J018

If yes, list CVPIA program providing funding, project title and CVPIA number (if applicable):

By signing below, the applicant declares the following:

- The truthfulness of all representations in their proposal;
- The individual signing the form is entitled to submit the application on behalf of the applicant (if the applicant is an entity or organization); and
- The person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section 2.4) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.

CHRISTOPHER L. KITTING, PH.D.

Printed name of applicant

Christopher L Kitting

Signature of applicant

PLICATION FOR DERAL ASSISTANCE

OMB Approval No. 0348-0

		2. DATE SUBMITTED: 5/15/00	Applicant Identifier:
PE OF SUBMISSION:		3. DATE RECEIVED BY STATE:	State Application Identifier:
plication: ☐ Construction; X Non-Construction	Preapplication: ☐ Construction; ☐ Non-Construction	4. DATE RECEIVED BY FEDERAL AGENCY:	Federal Identifier:

PLICANT INFORMATION

Name: California State University, Hayward et al.	Organizational Unit:
ess (give city, county, State, and zip code): Carlos Bee Blvd Hayward CA 94542	Name and telephone number of person to be contacted on matters involving this application (give area code): Dr. Chris Kitting (510) 885-3001
PLOYER IDENTIFICATION NUMBER (EIN): 9[illegible] - 1 5 2 4 9 2 2	7. TYPE OF APPLICANT: (enter appropriate letter in box) I A. State; B. County; C. Municipal; D. Township; E. Interstate; F. Intermunicipal; G. Special District; H. Independent School Dist.; I. State Controlled Institution of Higher Learning; J. Private University; K. Indian Tribe; L. Individual; M. Profit Organization; N. Other (Specify)
PE OF APPLICATION: ☐ New ☒ Continuation ☐ Revision vision, enter appropriate letter(s) in box(es) ☐ ☐ Increase Award; B. Decrease Award; C. Increase Duration; Decrease Duration; Other (specify): (Phase 2 is proposed)	9. NAME OF FEDERAL AGENCY: CALFED
CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER: XX - XXX TITLE:	11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT: Biological Restoration Improvements and Monitoring in Suisun Marsh Zone: Phase 2: Importance of Ponds along Marsh Channels
REAS AFFECTED BY PROJECT (Cities, Counties, States, etc.): Valejo Area, Sonoma Co. Martinez, ContraCostaCo. Concord and Oakley, Contra Costa Co. CA	
PROPOSED PROJECT	14. CONGRESSIONAL DISTRICTS OF: 9 and 13
Beginning Date: 2/01; Ending Date: 12/03	a. Applicant: Cal State U Hayward; b. Project: Restoration and Monitoring

ESTIMATED FUNDING: request

Federal	$ 1,491,835 .00
Applicant	$ 471,232 .00
State	$ - .00
Local	$ - .00
Other	$ - .00
Program Income	$ 0 .00
TOTAL	$ 1,963,067 .00

16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?

a. YES. THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:

DATE _____

b. No. ☐ PROGRAM IS NOT COVERED BY E. O. 12372
☐ OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW

17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?

☐ Yes If "Yes," attach an explanation. ☑ No

TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT, THE CUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE TACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.

ype Name of Authorized Representative: Christopher L. Kitting, Ph.D.	b. Title: Professor / Princ.Invest.	c. Telephone Number: (510) 885-3001
ignature of Authorized Representative: Christopher L. Kitting		e. Date Signed: 5/13/00

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Standard Form 424 (Rev. 7-97)
Prescribed by OMB Circular A-102

B. Executive Summary

Title of Project; Amount Requested. **Biological Restoration Improvements and Monitoring in the Suisun Marsh/North San Francisco Bay Ecological Zone. Phase Two: Importance of Ponds and other Features along Marsh Channels.** Amount requested: $ 1,491,835 .

Applicant Information. California State University, Hayward (CSUH Foundation), 25800 Carlos B Blvd., Hayward, CA 94542-3035 Phone: (510)885-3471; FAX (510)885-4747; primary contact: Chris Kitting, e-mail:ckitting@csuhayward.edu

Participants and Collaborators : Drs. Kitting and Rees, Dept. of Biological Sciences, Cal State Univ. Hayward; in collaboration with Dr. Karl Malamud-Roam, Contra Costa Mosquito and Vector Control; Drs. Sam McGinnis (Biology) and Dr. Joy Andrews, Chemistry, CSUH; Bryan Winton and Louise Vicencio, USFWS San Pablo Bay National Wildlife Refuge; and (less formally) Ken Burger, East Bay Regional Park District.

Description of Project. The project is located in CALFED Ecozone 2, specifically in North San Pablo Bay (Tubbs Is.) and South and East Suisun Bay, from Martinez to Big Break, near Antioch. It is a Phase II tidal marsh restoration and monitoring project, using integrated, non-destructive physical-chemical-biological monitoring with replication throughout each restoration and (adjacent, older, relatively natural) reference marshes. Objectives of our Phase II proposed project, which would encompass tidal marsh environments ranging from mesohaline to fresh-water in Ecozone 2 are: (1) to further increase tidal action, (2) provide ponds connected to channels, (3) identify and ameliorate limiting factors for key species and their food webs within restored marsh systems, specifically with regard to delta smelt and splittail, (4) to monitor and thus compare our reference (pre-restoration and relatively natural) and restored marshes (all with replicate sites) for productivity (fish and invertebrate populations), (5) to identify and ameliorate the factors that enhance productivity, and (4) to maintain, and monitor our reference and restored marshes through adaptive management with the aim of improving these and other Delta restorations. Our overall, testable hypothesis is that different conditions in our reference and restoration marshes yield different population densities of resident fishes and their food sources, and that rates of colonization into our marsh restorations by larval and juvenile fishes, whose adults live in deeper areas of the Estuary (specifically delta smelt and splittail), will tend to improve through time at restored marshes, with suitable conditions. Our project directly addresses uncertainty #10 (Shallow-water, tidal, and fresh-water habitat) as a limiting factor in overall Estuary restoration efforts. In our model, "marsh morphology" relates to CALFED uncertainty #'s 1 (Natural Flow regimes), #7 (Channel Dynamics, Sediment Transport, and ~Riparian Vegetation) and #9 (Bypasses as Habitat). All these uncertainties may limit native fish populations in our marshes. Results of our work will be prepared and presented to agencies and major conferences, where colleagues will provide feedback. We plan to publish our work in academic and applied journals. This proposal targets the following ERP strategic goals: *Goal 1: At-Risk Species*; We are concentrating on the life cycle stages and habitats of delta smelt and Sacramento splittail. *Goal 2: Ecosystem Processes and Biotic Communities;* Our proposal and previous work directly addresses the rehabilition of natural processes and biotic communities in the Estuary. *Goal 4: Habitats;* Marsh habitats worldwide are recognized as refugia and nurseries for larval and juvenile fishes. *Goal 5: Non-native Invasive Species;* Tidal marshes, like most Estuary habitats, have become homes for a variety of non-native invasive plant and animal species, whose effects we seek to control. *Goal 6: Sediment and Water Quality;* We propose to sample sediments, water, and organisms in selected restored and reference marshes for heavy metals, especially lead, mercury, and copper, for nutrients(N and P) and carbon flux (the latter requested by CALFED) .

C. PROJECT DESCRIPTION

1.Statement of Problem

a. *Description of Problem*. Our Phase II project is designed to further restore marshes to increased tidal action and to increase the size of SUITABLE aquatic animal habitat. We use broad-scale monitoring to compare a range of ~replicate marshes to identify and improve the physical, chemical, geomorphic, and biological factors that are most limiting in successful shallow-water marsh restoration efforts in the North Bay/Suisun Bay Ecological Zone (CALFED Management Zone 2) of the San Francisco Estuary (hereafter referred to as "the Estuary"). As propounded in the CALFED mission statement and in the literature referred to in the proposal below, successful marsh restoration includes the creation of suitable, sustainable, low-maintenance habitat in which both native and/or economically desirable non-native aquatic and terrestrial species (both species of concern and beneficial others) can successfully maintain viable populations.

Review of Relevant Studies. Ecological restoration should follow scientific principles, yet must conform to specific attributes of sites being restored, Estuarine restoration is guided by hydrodynamic laws common to all estuaries, and yet must address site-specific issues, such as climate, geology, and the suite of estuarine species present. In the San Francisco Estuary, the "X_2" value, a distance (in km) of the 2 ppt isohaline position measured from the Golden Gate Bridge, can be estimated in past years from a kneading of physical data common to estuaries worldwide (fresh water flows, tidal fluxes, etc.), but the effects that X_2 at any given time has on specific populations on Estuary species of interest (e.g. the native mysid *Neomysis mercedis*, longfin smelt) is confined only to the San Francisco Estuary (Kimmerer and Monosmith, 1992; Jassby, 1992). Estuaries are difficult to model due to poorly understood linkages among the physical parameters, water chemistry, geomorphology, and the biology of the species which inhabit the given estuary (Walters, 1997). Some estuaries offer broad generalities for comparison in restoration efforts, but lack the specifics of the San Francisco estuary (Ogden and Davis, 1994 in Everglades restoration). The particular concern of the San Francisco estuary and its threatened and endangered fish species, places special interest on their biology. In many cases, the biology of threatened Estuary species are not well known, such as the delta smelt (Brown and Sitts, 1999). Specifically, the role of shallow-water habitats in the life history of the delta smelt, and the optimum structure and other environmental parameters of marshes that encourage healthy smelt populations, are not well understood (Ibid, 1999). The approach of providing more tidal amplitude to increase fish populations is locally supported by Balling et al. (1979, 1980), and is expected to deter invasive plants (via tidal salt water) and aerate water through circulation.

Objective of Proposed Study. A key to successful aquatic habitat restoration, including shallow water tidal habitats, is to ensure that as many environmental linkages as possible are included. These linkages include physical, chemical, geomorphological, and biological factors that effect restoration efforts. The objectives of our proposed project within the North San Francisco/Suisun Bay ecological management zone include: (1) to identify and ameliorate limiting factors for key species and their food webs within the marsh systems we are restoring, specifically with regard to delta smelt and splittail, (2) to monitor our reference (pre-restoration and relatively natural) and restored marshes for productivity, (3) to identify the factors that enhance productivity, and (4) to monitor our reference and restored marshes, and armed with the results of monitoring, apply adaptive management techniques with the aim of if improving the productivity of our marshes, as well as other tidal marshes, in the Estuary.

b. Conceptual Model. *Technical Basis for Our Model*. We have used our initial, Phase I observations and monitoring results, which compare both "replicate" and very different marshes, as well as the different physical and biological factors found in each, to formulate the hypothesis that a positive correlation exists between increased population densities of most aquatic animals (including splittail and delta smelt) and the presence of "ponds" (shallow, permanent quiet-water

areas) along beside constructed channels. By experimentally connecting presently isolated ponds to channels used in most of our previous replicate restorations (and monitoring them, in comparison with control (or unmodified, reference) sites, we will use these large-scale field experimental manipulations to test for an increase in populations of zooplankton, zoobenthos, and native fishes. An alternative hypothesis is that west-coast migratory fishes may be less dependent on marsh conditions in general, as west coast marshes are younger, rarer, and more isolated in comparison with estuaries on the U.S. east and south coasts (after Onuf).

A diagrammatic model of our project, based on our recent evidence, is shown in Figure 1 of the Appendix (Existing Project Status). Each trophic level passes the necessary nutrients and energy to the next level, producing a "healthy" marsh habitat, with sufficient nutrients present for primary productivity, and with a healthy primary and secondary (zooplankton and zoobenthos) productivity in place to ensure food for both resident fishes and larval and juvenile fishes whose adults inhabit deeper areas of the Estuary. If zooplankton and/or zoobenthos are insufficient to sustain native larval and juvenile fishes, for example, energy flow within the entire system is stifled, and as a result, native adult fish populations will suffer. As energy passes from one level to the next, other limiting factors come into play, described in detail under "Relevant Uncertainties," below. We have found, for example, that ponds within marshes which are not subject to vigorous tidal flushing, have higher densities of zooplankton than shallow-water areas with vigorous tidal flushing. The mechanism(s) for these differences are not yet known, but could relate to the "floodplain" phenomenon observed in such areas as the Yolo Bypass during wet years (see scientific uncertainty #9, "Bypasses as Habitat" of PSP) and reservoirs of productive food (Kitting et al. 1994, Miltner et al. 1995).

Source of Information for our Model. Our model of a tidal marsh habitat is based on a generalized aquatic ecosystem model, and on data gathered to date from the Phase I of our work on tidal marshes in CALFED's Ecozone 2. Trophic levels in these marshes can sustain higher productivity if certain conditions are improved, such as addition of ponds along channels, which, we hypothesize, will act as nutrient reservoirs and as sources of food and refugia for fishes between high tides. Among our reference and restored marshes, high, dissolved nitrogen (N) and phosphorus (P) levels may be correlated with higher population densities of zooplankton, zoobenthos, and resident fishes. Larval and juvenile fishes of species whose adults are found in deeper parts of the estuary (delta smelt, Sacramento blackfish, possibly splittail) grow in shallow-water marshes where adults are rarely found. We hypothesize that juveniles either leave these shallow-water areas and grow to adulthood in deeper parts of the estuary, or they may entirely die in marshes, due to unfavorable environmental conditions, such as temperature extremes in shallow water. As in the Gulf of Mexico, eggs and/or larval fishes may enter tidal Estuary marshes after spawning takes place just outside the marsh (Kitting et al., pers. obs.).

Relevant Uncertainties. Our conceptual model in Figure 1 can be related to uncertainties and limiting factors of concern in CALFED's restoration efforts in Ecological Zone 2. Our project directly addresses uncertainty #10 (Shallow-water, tidal, and fresh-water habitat) as a limiting factor in overall Estuary restoration efforts. In our model, "marsh morphology" relates to CALFED uncertainty #'s 1 (Natural Flow regimes), 7 (Channel Dynamics, Sediment Transport, and Riparian Vegetation) and 9 (Bypasses as Habitat). All three of these uncertainties may be limiting to native fish populations in our marshes. *Natural flow regimes*, in our case channel morphology and the presence or absence of ponds in both our reference and marshes to be restored, could be critical to both nutrient availibility and ability of juvenile native fishes to feed and grow successfully. *Marsh channel dynamics and associated sediment transport* and (not riparian, but emergent) marsh vegetation could be critical to both nutrient availability and survival of small native fishes. *Bypasses*, or in our case, "ponds", large areas of shallow water, we hypothesize to be crucial to buildup sufficient nutrients, as sites for increased primary and secondary productivity, and as nurseries for abundant small fishes. "Phytoplankton and emergent

vegetation" and "zooplankton and zoobenthos" in our model addresses uncertainties #1 (Natural Flow Regimes), 3 (Decline in Productivity) and 6 (Non-native Invasive Species). We hypothesize that both primary and secondary productivity depend on marsh morphology, possibly the presence of attached ponds. Declines in overall Estuary productivity could be tied at least in part to loss of shallow-water marsh habitat and degradation of that marsh acreage that remains, especially with regard to sufficient, connected, "pond" areas. We have found many non-native plants and animals in both our reference and restored marshes. At one site, we found non-native hydroids in very high densities, lining the pipes through which tidal action fed the marsh. The size, and probably the presence, of the pipes were undoubtedly a risk to zooplankton and larval fishes, which had to pass what amounted to gauntlet of extended stinging tentacles on the inside of the pipes. Through adaptive management, bottlenecks now present in our marshes can be investigated, and, as appropriate, modified to ameliorate any marsh degradation, or design or construction flaws.

c. Hypotheses being Tested. *Testable Hypotheses.* Our work is based on the comparison of replicated types of marshes. Our overarching, testable hypothesis, based on our conceptual model, is that different conditions in our reference and restoration marshes may yield different population densities of fishes, particularly larval and juvenile fishes whose adults live in deeper areas of the Estuary (e.g. delta smelt and splittal); fish abundances or export rate of our shallow-water marsh restorations by may differ, depending on the "health" (rate of energy transfer up the food web, with minimal limiting factors) of the marsh in question. A second hypothesis is that each of our suitably restored marshes will accrue habitat value through time, and will eventually exceed that of reference marshes. In particular, we hypothesize that both the presence of intertidal vegetation and invertebrate food resources are vital for fishes to colonize restored marshes. Our restorations thus may attain animal densities (or productivities) exceeding those in reference and other marshes.

CALFED Goals and Uncertainties Being Addressed. The following Ecosystem Restoration Plan (ERP) Strategic Goals are being addressed in our project: Goal 1: Recovery of At-Risk Species. Our project is directly addressing the recovery of two at-risk species, delta smelt and Sacramento splittail. We aim to identify uncertainties which improve survival of delta smelt larvae and juveniles in our marshes, using the hypothesis that shallow-water areas of the Estuary (perhaps not only in tidal marsh Estuary areas), are critical for the recovery of healthy delta smelt populations. Our project will also address the importance of shallow water tidal marshes for establishment of healthy splittail populations in the Estuary. Goal 2: Ecosystem Processes and Biotic Communities. Through our shallow-water marsh restoration efforts we aim to achieve marshes which will persist with a minimal amount of human intervention, and which will have natives as dominant species. Uncertainties addressed here in our project include the role of large shallow-water areas, or "ponds" to act as nurseries for food for larval and juvenile native species in tidal marshes. Goal 4. Estuary Habitats. We are aiding, though monitoring and adaptive management, restoration of functioning areas of tidal, mesohaline to virtually fresh-water marshes. Uncertainties addressed here include whether native species will benefit as much as introduced species in tidal marsh restoration. Goal 5: Non-native Invasive Species. With respect to non-native species, we have two goals in our adaptive management plan of marsh restoration:(1) the removal of non-native plant and animal colonists in our marshes, as appropriate (yellow-fin gobies, green crabs, mitten crabs, all as requested by DFG), and (2) to eliminate conditions that encourage the establishment of healthy populations of non-natives in our marshes (e.g., the role of "pipes" as conduits of water to marshes, which harbor populations of introduced hydroids), identifying and eliminating "bottlenecks" in tidal flow to marshes, such as modifying silt deposits or gates and other structures to enable fishes to pass into marshes).

d. Adaptive Management. *Relation of Our Conceptual Model to the Adaptive Management Design (Healey Ladder).* Each trophic level in our conceptual model can be related to the

"Healey Ladder" and "Healey Adaptive Management Process" of the adaptive management process. In our proposed project, restorations can be considered both as "pilot" and "large-scale" implementation projects, which will vary from 1 to 300 acres (Step 4-Healey Ladder). Through monitoring, each trophic level will be assessed as to whether limiting factors or bottlenecks are at work during the restoration process. Advice will be given to our colleagues as to how these limiting factors apparently can be minimized. Under "initiate restoration actions" (Step 4 of the adaptive management process), "Learning" in our case relative to the Healey ladder would consist of information gleaned in the context of Monitoring (Step 5 of the Healey ladder), and of ongoing results of each or our restoration projects being "fed-back" into each restoration (through Step 6 of the ladder) to improve habitat conditions for native species (back to Step 4). An adaptive management loop from Steps 4, through Steps 5 and 6, and back to Step 4 will be established so that we can continually feed information by means of a learning process back to managers in order to continually improve the restoration process.

Justification for the Proposed Project. As in many estuaries, San Francisco Estuary has lost much of its low-salinity marshes, known to be so important to many estuarine fish species (e.g. Schubel 1992). Concomitantly, shallow-water tidal marsh areas have been converted for agriculture around the Estuary, resulting in a small remaining fraction of functioning estuarine tidal marshes, areas known to be highly productive and nurseries for young fishes (Wetzel 1975). The justification for our project overall is based on our approach of increasing key areas of tidal marsh to increase the Estuary area and quality of low-salinity habitat. Our project directly addresses the uncertainty that an increase in the area of low-salinity marshes *should* result in increased overall Estuary productivity and populations of threatened Estuary fish species. Our project is, in one sense, both pilot and full-scale restoration, as relatively large areas (~750 acres) will be restored to increased tidal action and aquatic biological function, and yet such areas are relatively small in terms of total potential Estuary tidal marsh area suitable for restoration. Our simultaneous monitoring of both reference and restoration marshes will enable a continuous fine-tuning and resolution of uncertainties, limiting factors, and bottlenecks in restored marshes. Testing changes in restoration design based on our adaptive management practices will support or modify our hypotheses about improved habitat for larval and juvenile native threatened species (delta smelt,splittail), and about other CALFED ERP goals. The improvements would be used in future restoration projects, both by ourselves and others.

e. Educational Objectives. The proposed project does not have a primarily educational objective, although PI's, collaborators, student assistants, and our audiences will learn and train others throughout the duration of the project, and beyond it.

2. Proposed scope of work

a . Location and Geographic Boundaries of the Project.

Counties Where Project is Located: Sonoma County; Contra Costa County. *Ecozone included*: Suisun Marsh/San Francisco Bay (Zone 2). San Pablo Bay is Zone 2.5. Suisun Bay Marsh is 2.1. A reference site for preparing restoration permitting is on the border between 2.1 and the Central and West Delta, Zone 1.4.

Map with Outline of Project Sites (One wide and four detailed maps attached, in appendix)

Digital Geographic Coordinates of Project Sites: (A table of restoration sizes and GPS boundaries and centers, for NAD 83 datum, immediately follows the proposal. Also noted on maps in appendix):

Photographs of Project Sites: (attached, with maps in appendix)

b. Approach. *Sampling; Methods and Techniques.* We employ integrated, non-destructive physical-chemical-biological monitoring, with replicatation, throughout each restoration (and adjacent reference marshes) to evaluate and improve restoration success through adaptive management (Kitting 1993). Our restored marshes are sampled before, during, and after

restoration to increased tidal action. These marshes include those restored to full tidal action, and others restored to increased, though still "muted" tide action. Emphasis will be placed on monitoring habitats for CALFED priority fishes, particularly delta smelt, splittail, Chinook salmon (all runs), steelhead, green and white sturgeon, and their food resources (zooplankton and zoobenthos). Our sampling protocol, schedule, and logistics are designed to minimize impacts to each site. For example, kayaks are used as access to more remote sites. Muddy equipment is washed (and misted with alcohol) to minimize any transfer, among sites, of aquatic animal pathogens present in marsh mud. Non-destructive sampling of biota is performed via standardized field photography and counting of specimens prior to returning from the field. Seasonally, sediment accumulation or net erosion in sediment traps (or with sediment "pins") also is assessed. Approximately monthly, zooplankton are enumerated from replicate 0.25-m^3 tows. Ichthyoplankton also are checked from 1-m^3 tows. Similarly, epibenthic sampling is performed in replicate 0.05-m^2 thrown cage samplers after Weinstein pers. comm. and Huh and Kitting (1985). "Crayfish" traps and "minnow" traps are used for sampling larger, less abundant epibenthos and nekton, such as large crustacea (including crabs and crayfish) and certain fishes. Larger fyke nets seasonally sample the above large taxa and larger fishes passing through the mouth of each marsh. Occasional mortality, and removal of common invasive species (such as yellowfin goby and mitten crab) may enable additional assessment of diets of the common fishes or invertebrates associated with marshes. Care (nets extending above water) is taken to prevent risks to air-breathing animals such as beavers, otters, muskrats, turtles, and frogs, whose presence in each area is tabulated qualitatively. Occasional specimens are preserved for reference/voucher specimens, and will be maintained at the university.

Data Collection, Equipment, and Facilities. Physical, chemical, and biological data (previous and additional factors) will be gathered systematically for each reference and restoration marsh. Sampling locations are identified and logged via Garmin dGPS (differential global positioning system, accurate within a few meters). Other information, logged approximately monthly (see basic data table in appendix), includes site identification, date/time/tide, physical factors (below), and replicated animal abundances with 1-m^3 plankton tows, thrown cages (benthos), and fish live traps/artifical refugia. Physical factors include approximate wind and water current, and quantitative data on physical factors of: water depth, clarity (secchi depth), and basic surface and bottom water parameters (with YSI probes and now YSI 600XL recorders, seasonally for continuous ~3-wk records of): temperature, depth, salinity/conductivity, pore water salinity/conductivity (subsurface, if different), redox, and O_2 content. Sediment accumulation or net erosion in sediment traps (or with sediment "pins") also are assessed seasonally, along with analyses of large fishes (in fyke nets and sonar), plant densities (in permanent quadrats), metals, nutrients, and carbon flux (after Morgan and Kitting 1984) seasonally. We use office and laboratory space at the main and Contra Costa CSUH campus, in mobile labs, the CSUH Bay/Delta Area Shore Institute at Alameda Point, at the SPBNWR offices, and at CCMVC.

Analytical Procedures. Nutrient anions including nitrate and phoshate, cations, and dissolved transition metals will be measured using a Dionex DX 500 Ion Chromatograph. Total N, P and organic C will be measured using a microwave digestion (for orthophosphate) then Hach COD reactor and colorimetry. Total metals are determined (EPA procedures) by microwave digestion followed by atomic absorption using a Perkin Elmer Aanalyst 300.

Construction Procedures (Enhancing recent restorations). Additional tidal amplitude will be provided to each restoration site (and possibly former reference marshes) periodically as necessary, through widening physical bottlenecks or silt deposits, generally by hand or with our small equipment, including water pressure. Native marsh vegetation threatened by these activities will be transplanted locally, to replace patches of invading plants and to stabilize sediments that slump into channels, especially near openings to tidal creeks, from where sediments would flow into new openings. At most sites, existing, presently isolated ponds or

newly excavated ponds (where invasive vegetation is removed, generally by hand) will be connected to restored channels, equipped with wiers to maintain adjustable water levels in ponds at low tide. CCMVC is donating their restoration work for any more extensive excavation necessary to provide shallow ponds along channels. To prepare for future restorations, our use of reference sites at Big Break, with and without marshes and ponds, will enable permitting to proceed, to maintaining suitable, potential restoration sites in line for future implementation.

Statistical Analysis and Quality Control Procedures. Biological data are tabulated with at least four replicates per sampling date, per site (usually twice that). Sampling is performed approximately once per month, more frequently if the situation dictates (e.g., presence of species of concern). Orders of magnitude differences among data sets at sites are statistically distinguishable using sets of four replicates. Significant qualitative observations are noted and communicated to others of the team for confirmation as required. Consistency among team-mates and Sr. scientists is achieved through together sampling >~8 replicate samples per site (>~40 samples), or more, until observations are consistent. As each season or year of data is obtained, graphic and (often non-parametric) statistical analyses of data, as appropriate, will be conducted. Quality Assurance/Quality Control procedures include careful standardization of methods and confirmed species identification, performed by photography and experienced PI's and their personally trained and supervised assistants. Each senior staff will continue to collect and analyze data first-hand throughout the project.

Criteria Used in Hypothesis Testing. Some of our criteria used for hypothesis testing are qualitative: e.g. that both intertidal vegetation habitats and invertebrate food resources will be necessary (and that neither is sufficient, alone) for native fishes to colonize restored marshes. Other criteria are quantitative (for statistical significance with nonparametric statistics): e.g. that each (or most) suitably restored marshes will tend to accrue increased habitat value through time, and exceed that of our relatively natural reference marshes. A less conclusive, but useful, criterion may have to be based on intermediate probablilities (such as in weather forecasting), seeking merely increased probabilities of a successful population recruitment (analogous to Kitting and Morse 1998). Our hypothesized improvements in these restorations, through the process of adaptive management, would lead to productivities (export of zooplankton, zoobenthos, and fishes) exceeding those in our reference and other Estuary marsh communities. Already, three of our four restored and reference marshes that have high animal abundances yielded delta smelt or splittail populations over ~100x the maximum population densities reported in DFG monitoring (the latter, apparently in deeper water).

c. Monitoring and Assessment Plans. Comparative monitoring forms a major focus of the project. See attached data sheet for monitoring components (following budget table). We have found that our monitoring will be adequate to determine the success of our restored marshes relative to CALFED goals (see section c :"Hypotheses being tested" in this proposal, for identification of our CALFED goals.) Emphasis will be placed on the monitoring of suitable habitats for CALFED priority fishes, particularly delta smelt and splittail, but including Chinook salmon (all runs), steelhead, and green and white sturgeon. Comparative monitoring will be an essential and integral part of these marsh restorations. Analysis of species colonization, migration and other environmental parameters will take place throughout the project. The monitoring and experimental design used to assess the outcome of the restorations will follow the scientific protocol of successful biological restoration work carried out elsewhere: Zedler's PERL handbook, Hymanson and Kingma's Coastal Conservancy Handbook, or the recent SFEI CMARP website (http://www.iep.water.ca.gov/ cmarp/reports/).

d. Data Handling and Storage. Data are logged directly into our standardized, initialed data tables in Microsoft Excel (see sample data sheet attached). Data are checked and analyzed/interpreted (and backed up, off campus) by the responsible PI: Kitting for physical factors and small nekton (swimming animals), Rees for plankton and epibenthos (small animals

on bottom), and McGinnis for larger nekton. Our data website (ftp://imctwo.csuhayward.edu/marsh) and our USFWS collaborators' websites (M\Data\SFB\WetRes\Plants\VegTI799.xls and M\Data\SFB\WetRes\Birds \Data\SBTI899.xls plus link) are used for posting such results on the internet, as requested.

e. Expected Products/Outcomes. We will submit quarterly reports and annual reports, in a scientific paper format, to the collaborating agencies throughout the project. If desired, our drafts of major reports are available in advance to these collaborators, for their comments. Results of our work are prepared and presented to agencies and major conferences, where our oral presentations will provide feedback from colleagues. We plan to publish our work in academic and applied journals. Reprints acknowledge the collaborating agencies as appropriate.

f. Work Schedule. *Project Start and Completion Dates* Project start date: February, 2001; Project completion date: by December, 2003.

Tasks. (All four tasks are described in budget. As in our previously funded CALFED Phase I, work is comparative, and thus requires multiple types of duplicate sites in each task. Additional separation of project tasks would require negotiation. It is not possible to identify all project management as a separate task, as each senior scientist manages his/her specialty, as described in our table. Task 1 can be considered general project management, noted as required if any other task is funded.

TIME LINE and SCHEDULE MILESTONES

Year 1				Year 2				Year 3			
qrt 1	qrt 2	qrt 3	qrt 4	qrt 1	qrt 2	qrt 3	qrt 4	qrt 1	qrt 2	qrt 3	qrt 4

(Task One, administration and general reporting, throughout.)

Task 2. Marsh restoration and vegetation/pond establishment during summer, yr 1. Big Break (and/or Concord) permitting for future restorations begins, throughout.

Task 3. Physical and biological monitoring and improvements, throughout

Task 4. Water chemistry monitoring and improvements

g. Feasibility. *Demonstration of Project Feasibility.* We have proposed a work schedule and workload that can be completed in the time allotted. Based on the experience of the first phase of our project, the project approach for this second phase is similar to the first, and we have experienced few disruptions in our monitoring schedule, laboratory work, data entry, and information dissemination through papers and meeting participation. In the second phase, we are undertaking several more sites that were *not* proposed in the first phase. Restorations and monitoring of these sites will require more time, but we have budgeted appropriately for this extra work.

Description of Methods. Our methods are outlined in the "Approach" section of the proposal, above, as are the references to our scientific and technical procedures used (see Section I: References). Weather has not been a major issue for completing our work in Phase I of our project, and we do not see that it will be a problem in Phase II. Alternative sites to restore nearby

are available through our collaborators (especially CCMVC), if necessary. For example, in the unlikely event that EBRPD might not reach the permitting stage, CCMVC would be able to complete that work nearby. We do not have any other contingencies or requirements, such as outstanding permitting issues, that will impede the start or completion of Phase II of our project.
Permits and Agreements Necessary for Project Implementation. Permits and necessary agreements are complete at all but one site (see attached form). An additional m.o.u. for manipulation of sensitive fish species is pending, which is not critical for the proposed work, but could allow additional mesocosms to manipulate delta smelt densities experimentally within the marshes, analogous to Kitting et al. (1997 and in prep) and tidal pond experiments with snapper in cages (Guerro-Tortolero et al. 1999) sustainable at our periodically observed, high fish densities. Other scientific permits are complete, and can be renewed.
Private Property and Right of Access Issues. All property and right of access issues have been approved, and are now in effect. Property managers are our partners. Other documents attached.

D. APPLICABILITY TO CALFED ERP GOALS AND IMPLEMENTATION PLAN AND CVPIA PRIORITIES.

1.ERP Goals and CVPIA Priorities. This proposal targets the following ERP strategic goals: *Goal 1: At-Risk Species.* We are concentrating on the following species for life cycle stages and habitats: delta smelt, Sacramento splittail, white sturgeon, green sturgeon, and all runs of salmon. The habitats studied are shallow-water tidal marshes. Our work is focusing in particular on stressors associated with larval, juvenile, and adult stages of delta smelt and splittail, especially habitat salinity, temperature, and adequate food resources. Knowledge gained from our work in these shallow-water habitats is shedding light on the role of these features in the life cycle of the delta smelt and splittail, and can enlarge and improve habitats for these threatened species; *Goal 2: Ecosystem Processes and Biotic Communities.* Our proposal and previous work directly addresses the rehabiliation of natural processes and biotic communities in the Estuary;. specifically, how we can improve our somewhat degraded "reference" marshes as well as restored marshes so as to improve habitat for endangered species, again for delta smelt and splittail, but for other important species such as salmon and salt-marsh harvest mice. Our proposal directly addresses productivity in shallow-water tidal marshes and how increased productivity, through marsh modification (ponds) and removal or modification of bottlenecks (gates, pipes, silt deposits) can benefit threatened species as well as the overall health of marshes and the general Estuary; *Goal 4: Habitats.* Marsh habitats worldwide are recognized as refugia and nurseries for larval and juvenile fish. We have shown certain of our tidal marshes to harbor larval and juvenile delta smelt and adult splittail, and other native species also concentrate in these marshes. Our proposal and previous work directly addresses the protection and functional restoration of shallow-water tidal marshes as areas of increased general productivity and as fish nurseries; *Goal 5: Non-native Invasive Species (NIS).* Shallow-water tidal marshes, like most Estuary habitats, have become homes for a variety of non-native invasive species, including plants (which can block channels and crowd out native plants), invertebrates (hydroids, mitten crabs, green crabs) and fishes (largely yellowfin goby and cameleon goby). Some of these introductions may be of neutral benefit (introduced copepods as fish food, having replaced native copepod species), while some are obviously destructive (hydroids capturing plankton and perhaps larval fish; introduced fishes consuming or otherwise displacing native species). We will address NIS goal II: limiting the spread, or when possible, eliminating local NIS populations through adaptive management. Hydroids can be deprived of much of their habitat (hard substrates associated with strong currents), and non-native fish species can be selectively removed locally during routine sampling procedures. *Goal 6: Sediment and Water Quality.* We propose to sample sediments, water, and organisms in selected restored and reference marshes for nutrients, carbon flux, and heavy metals, especially lead, mercury, and copper (critical in

Shell Marsh, and apparently can repel fish migration; Goldstein et al. 1999). Toxicity levels will be related to other ecosystems to determine if threshold levels are exceeded, and if so, what effects heavy metals are having on higher trophic levels. Our comparisons of nutrients in and carbon flux through marshes will test for potential limitations in these marsh communities.

2. Relationship to Other Ecosystem Restoration Projects. Our overall aim is to systematically improve, monitor, and compare an array of paired reference and restored marshes throughout CALFED Ecological Zone 2, through the use of adaptive management. With CALFED ERP goals as guidelines, we seek to test conditions for increased populations of native threatened fish species, improve shallow-water marsh ecosystem processes through marsh modification, and improve general marsh habitat and microhabitat (after Holt, Kitting and Arnold 1983), reduce, as much as possible, the impact of non-native species, and determine the role of heavy metals or nutrients in increasing environmental stress in shallow-water marshes. Phase I of our project has begun this process, and has shown that many of our tidal marshes do harbor threatened larval and juvenile fish species (see attachment of our progress to date). We hope to use our results to aid and advise other restoration efforts in this ecological zone, CALFED and otherwise, particularly with regard to methods of habitat improvement and sampling species non-destructively. We have worked successfully in this manner to continue with this phase of the project with the US Fish and Wildlife Service San Pablo Bay National Wildlife Refuge (North San Pablo Bay and Tubbs Island), with Contra Costa Mosquito and Vector Control (Shell Marsh, Pt Edith Marshes, Weapons Detachment Concord marshes), and with East Bay Parks (Big Break marshes), all of whom have future restorations planned.

3. Requests for Next-Phase Funding.. See the attached two-page summary of our existing project progress to date, plus Appendix tables. This proposal both continues and expands work performed in the first stage of the project.

4. Previous Recipients of CALFED or CVPIA funding. Previous CALFED Project Title: Biological Restoration and Monitoring in the Suisun Marsh/North San Francisco Bay Ecological Zone: An Ecosystem Approach to Improve Effectiveness of Bay/Delta Restoration. Previous (present) CALFED Project No. # 114209J018.

Current Project Status and Progress to Date (See Attachment)

5. System-Wide Ecosystem Benefits. *Synergistic, System-Wide Ecosystem Benefits*. Our project, over time, will improve shallow-water marsh ecosystem functioning throughout Ecological Zone 2. Improved shallow-water tidal marsh productivity and increase in populations of threatened fish species will ultimately benefit productivity and threatened fish populations in the entire lower Estuary. Increased productivity in shallow-water marshes will also improve conditions for other non-aquatic marsh biota, such as waterfowl and other marsh-dependent birds (including clapper and other rails), and mammals (otters, beaver, salt-marsh harvest mice). Our project compliments marsh restoration efforts in the Napa and Petaluma Rivers, and Northern Marin County (similar habitats), and in southern Suisun Bay by working with Shell (McNabney) Marsh and its Marsh Management Advisory Committee, with Contra Costa Mosquito and Vector Control, and with Delta Science Center and EBRPD eastward.

E. QUALIFICATIONS

Dr. Christopher L. Kitting, Professor of Biological Sciences, CSUH

Professor Kitting earned his Biological Sciences Ph.D. in 1979 with a Stanford University Fellowship. Kitting currently serves on several review panels for environmental effects on aquatic organisms. Kitting serves on the Board of the San Francisco Bay Wildlife Society and Program Committee for the Delta Science Center. His collaborative work with Alameda County marsh construction recently earned an EPA National Excellence award. His subsequent work received nominations for outstanding professor awards and for an Environmental Achievement

Award on the Delta. He was an invited speaker at three Regional Bay Vegetation Research Workshops, a 1991 Estuarine Research Symposium on Advances in Ecological Methods, and Conference for Educators at the California Academy of Sciences. He is a member of the American Fisheries Society, and Society of Ecological Restoration, ASLO, Ecological Society of America, and other groups. He presents principles of limiting resources to undergraduate and graduate students in laboratory and field exercises, in grant reports, and at international research meetings. In his 25 major publications, most emphasize dynamics of vegetation effects on animal populations. Recent relevant examples: (1) Kitting, C.C. Ouverney, and F.Canabal. Small Fishes Concentrated During the First Five Years Outside an Experimental Wastewater Marsh in San Francisco Bay. Proc. Soc.Wetl.Sci.1994. DM Kent and JJ Zentner, Eds. pp. 90-103. (2) Kitting 1994. Shallow populations of small fishes in local eelgrass meadow food webs. Alameda Naval Air Station's Natural Resources and Base Closure. Audubon Society, Berkeley, CA pp 65-83. (3) Kitting 1996. Comparing naturally occurring population, as field bioassays of environmental health. in D.M. Kent and J. Zentner, Eds. Proc. Soc.Wetl.Sci. II. (80-83). (4) Kitting and D.E. Morse 1997. Feeding effects of postlarval red abalone, Haliotis rufescens (Mollusca: Gastropoda) on encrusting coralline algae. Molluscan Res. 18:183-196. (5) Ouverney, C.C. and Kitting. (for Bull. Environ.Contam.Toxicol.) Field Bioassays on Common Epibenthic Organisms Near a Treated Wastewater Marsh in South San Francisco Bay. (6) Evans, K.L. and Kitting (for Limnol. Oceanogr.) Feeding activity and growth in freshwater sponges from the California Delta. (7) Kitting Field bioassays throughout marshes receiving suburban stormwater runoff. (invited for Env. Engineering).

Dr. John Rees, Adjunct Faculty, Senior Research Scientist, Bay/Delta Area Shore Institute, CSUH

Dr. Rees received his Ph.D. in Zoology at the University of California at Berkeley in 1975, with research emphases in invertebrate field populations and laboratory culture. He holds an adjunct appointment at Cal State U. Hayward in the Department of Biological Sciences, and heads the Bay/Delta Area Shore Institute located at Alameda Point. Dr. Rees has had 20 years experience in environmental project management, in both the public and private sectors. He has nine years post-doctoral and senior scientist experience, performing field and laboratory aquatic mesocosm research in the Energy and Environment Division at the Lawrence Berkeley Laboratory. Dr. Rees has applied and basic research experience in general freshwater, estuarine, and marine ecology, ecological field sampling techniques and data analysis, and general water quality issues. Selected relevant publications: (1) Rees, J. T., and L. Gershwin. 2000. Non-indigenous hydromedusae in California's upper San Francisco Estuary: life cycles, distribution, and potential environmental impacts. Sciencia Marina (in press) (2) Rees, J.T. (1999) Non-indigenous jellyfish in the upper San Francisco Estuary: potential impacts on zooplankton and fish. IEP Newsletter 12(3):46-50 (3) Harte, J., D. Levy, and J. T. Rees. 1983. Pelagic diatom populations in lentic freshwater microcosms. Intern. Rev. Gesam. Hydrobiol. 68:255-267. (4) Rees, J.T. 1982. The hydrozoan *Cladonema* in California: a possible introduction from Japan. Pac. Sci. 36:439-444. (5) Rees, J.T. and J. Oldfather. 1980. Small scale mass culture of *Daphnia magna* Straus. Proc. World Maricul. Soc. 11:202-210. (6) Rees, JT 1979. Community development in freshwater microcosms. Hydrobiologia 63:113-128

Contra Costa Mosquito & Vector Control District's Principle Investigator is Dr. **Karl Malamud-Roam,** CCMVCD's Marsh Specialist for over 8 years. He has designed and implemented eight tide marsh restoration and enhancement projects in the San Francisco Estuary, covering over 300 acres. He is the project manager for the million-dollar, 200-acre Shell Marsh Restoration Project; after six years of study and design, construction began last year. He is also Project Manager for the 2000-acre Point Edith Marsh Project, and has overseen implementation and evaluation of two pilot projects to date. Currently he is developing a natural resources inventory and integrated natural resources management and restoration plan for the latter site.

Mr. Malamud-Roam is a doctoral candidate at UC-Berkeley, where he is finishing a dissertation on the hydrology and ecology of muted-tidal marshes. His primary study sites are the marshes discussed in this proposal. He has a BA in Biology from Princeton University, an MA in Physical Geography from UC-Berkeley, and he is the author of one book chapter and four articles, all on the tidal hydrology and ecology of this area.

Dr. Samuel M. McGinnis, Professor of Biological Sciences, CSUH

Dr. McGinnis is an ecologist who specializes in the aquatic and terrestrial wildlife and plants of the greater San Francisco Bay Area. He earned his Ph. D. from University of California, Berkeley in 1965, and has conducted courses and supervised graduate research in ichthyology and vertebrate natural history since 1964. His major role in the present project will be in fish sampling and habitat improvements. His major activities in recent years have centered around endangered and threatened plant and animal species. The majority of his work has been conducted for government agencies such as the U S Fish and Wildlife Service, the California Department of Fish and Game, the California Department of Transportation, the California Department of Parks and Recreation, and the planning departments of San Mateo, Alameda, and Contra Costa Counties. Dr. McGinnis has conducted field studies and written independent reports or the biological sections of environmental impact reports for over 95 projects since 1979, including over 20 in eastern Contra Costa County, funded by a number of agencies and clients. Examples of his recent reports in environmental projects from 1993:
(1) A survey to determine the status of the California tiger salamander on a proposed land fill expansion site, Fairfield, CA. 1993. A study conducted for Wetlands Associates, San Rafael, CA (2) An evaluation of the lower reach of Tunitas Creek as a viable steelhead rearing site and habitat for other special status aquatic species 1993. Conducted for Caltrans, Oakland, CA. He also authored Freshwater Fishes of California 1984 - a 316-page book covering all freshwater fish species in California, published by the University of California Press.

Dr. Joy C. Andrews, Assistant Professor, Department of Chemistry, CSUH

Dr. Andrews, an environmental chemist, received her Ph.D. in Biophysical Chemistry at the University of California, Berkeley in 1995. She was a postdoctoral Associate at Lawrence Berkeley National Lab and has had private sector experience in analysis of metals in aquatic systems. Dr. Andrews has taught water quality courses involving field studies, laboratory analyses and biological remediation at UC Berkeley and CSUH. She is currently supervising several graduate students in water quality analysis projects involving ion chromatography, atomic absorption spectroscopy and x-ray absorption spectroscopy, with studies in biological remediation of heavy metals, especially by plants. She has co-authored a book on water quality analysis, "The Chemistry of Water," as well as 6 papers in leading chemistry journals and 2 conference proceedings on the analysis of manganese in plants. Her role in this project will be to monitor the water quality of the restored and control marshes on an ongoing basis.

Collaborating Participants

Our seven major collaborators from four agencies, including CSUH, are listed under "participants and collaborators" in the executive summary. Professor McGinnis, becoming Emeritus, will continue our sampling of large fishes along Contra Costa Shores. Over 20 additional, significant collaborating assistants, working under these professionals on this project, are listed in our acknowledgements of our annual report to CALFED (on file).

See Table 1 for the organization of the staff and resources for the proposed project.
We do not anticipate any conflicts of interest or insurmountable problems to complete the work within the proposed timeline.

Table 1. Organization of Staff and Resources for the Proposed Project.

Staff Member And Tasks	Technical Role	Administrative Role	Project Management Role
Chris Kitting (Tasks 1-4)	Field sampling; collection and entering of physical data; its interpretation; report and paper preparation	Overseeing overall expenditures and bookkeeping	Overall Project PI. Also coordinating assistants and collaborators
John Rees (Tasks 1-4)	Field sampling; collection, enumeration identification, of zooplankton and zoobenthos; their data entry and interpretation; report and paper preparation	Coordinating facilities	Overseeing student assistants and technician
Sam McGinnis (Contra Costa) and new associate (Contra Costa &San Pablo Bay (Task3)	Field sampling for fish; enumeration and identification of fish species; data analysis		Overseeing student assistants
Joy Andrews, Associate (Task 4)	Analysis of CHEMISTRY; data interpretation and preparation		Overseeing student assistants
Karl Malamud-Roam (funded by CCMVC directly)	Shell Marsh and Pt Edith area planning and connection of ponds to restored channels	Overseeing expenditures and reporting for CCMVC portion	Oversees Shell Marsh and Pt Edith area restorations and staff for plant monitoring there.
Cynthia Vinson or Successor (funded by indirect costs)		Bookkeeping, billing, dispersing funds	

F. COST (3 pages) 1. Budget

Detailed and Summary Budget. (See attached budget sheets).

Budget Justification. Our proposed **Phase Two** budgets are attached in a Microsoft Excel "Workbook." The tables detail each of four tasks, for each year, plus summary (Yrs1+2+3). Tasks, categories, allocations, rates, and organization are based on our presently contracted budget, for Phase 1. Task One, General Project Management, is now separated, as CALFED requests. As in the past, our partner institutions have line items where appropriate. Funds requested from CALFED are to the left of matching funds, plus totals for each item.

Moderately increased costs reflect this 2001 forecast, plus ~50% expanded effort and expenses for ~50% more restoration and ~100% more reference sites, compared with Phase One funding. Our proposed +- 10% reallocation among categories, if necessary, reflected our updated agreement in our present contract, to accommodate unforeseen expenses efficiently. As noted, no changes in total cost are proposed.

This proposal cycle is our only opportunity for continued funding, to enable the valuable comparisons and large-scale field experimental restorations (to add more tidal amplitude or ponds to restorations) in Phase Two. Due to a change in CALFED funding cycles, a <9-month overlap in Phase One and Phase Two will occur. Thus, time allocated to Phase Two is limited during this proposed Year One, while Phase One work and funding is completed on schedule, or slightly ahead of schedule as US Fish and Wildlife Service has requested. (As requested by CALFED, we already have proposed possible funding for additional sites immediately, related to phase One. However, those "ready to go" project funds have not appeared.) Proposed Yr 1 has virtually all of the equipment purchases. After those initial purchases, funding would be spent steadily, then invoiced to CALFED, as scheduled.

The major budget request is in salaries, and each staff member has a major commitment to this project, as described in the required table. The budget is consistent with university policy,

including time released from classes (largely matched by the university), time paid during summer, and during academic breaks ("Article 36" of current faculty agreements). The California State University has pledged to close a salary gap between recent senior faculty salaries here, compared with comparable institutions nationwide. Because the resulting salary steps have become retroactive from the state (recently planned to be retroactive two years), each of these proposed salaries reflect the target amounts. Phase I salary budgets were adequate only because the PI was able to donate most of his sabbatical leave (during reduced state salary) to Phase 1. For phase two, these proposed funds would release Kitting from almost all classes, allowing a full commitment to this project. If the state eventually rejects these amounts for academic year salaries, we propose that any salary excess be available for a new faculty member, who would then share the commitment to this project. Thus, the budget notes "and associate" listed with faculty in the itemized budget. Assistants are noted with a range of salary, to reflect various degrees of expertise. Several of our graduate research assistants (e.g. H. Kingma, coauthor of a restoration monitoring handbook) are established professionals, although these state pay scales tend to remain low.

Type of Extent of Travel. All of our travel will be within the state of California, to restoration and monitoring sites, and to conferences within the state. Teams conduct approximately monthly trips to each pair of sites. Standard state rates are used for travel, normally in university vehicles charged at that rate. Some sites are accessible only by boat. Boat rates, established by CSUH Boat Committee, help cover the actual receipts for repairs, maintenance, supplies, and replacement equipment.

Types of Supplies. Mainly for field work (containers, boots, etc. and nets, damaged in shallows).
Service Contracts. None, other than repair costs anticipated in attached budget.
Consultants and Organizations. None, other than partners with line items described in budget. Marsh construction is accomplished directly by our partner, CCMVC, who again is donating their work in return for our proposed assistance in planning and monitoring (for permits).
Equipment Purchases. The major equipment item is a microwave digestor, which would make the numerous orthophosphate and metal analyses efficient enough to compare the range of sites, as proposed. The university will share half the cost. Equipment and other expenses, including expenses for remote labs for much of this work, as proposed, are justified in our methods sections, and in our report of present progress.

Overhead Rate. General office and laboratory function is covered in the overhead rate, along with accounting expenses and general administration. As noted on budget, CSUH is willing to decrease its overhead rate to 25% of total direct costs (=20% of total grant costs.) As noted in budget, the CSUH federally negotiated rate for indirect costs would be 47% of salaries, wages, and benefits. The university will provide this additional match as unrecovered indirect costs.

Project Management Task. All of the senior staff noted are involved in project management. They ensure that work areas are complete, and inspect others' work in progress. Each PI is responsible for his/her area of expertise and reporting his/her part of required periodic reporting requirements. Project questions should be addressed to (1) Chris Kitting- scientific/technical questions; (2) Cynthia Vinson and/or Chris Kitting – budgets, costs, and financial allocation.

2. Cost-Sharing.
Cost Sharing Arrangements. As noted on budget, CSU Hayward will match much of the faculty release time from classes. It also will match a major equipment expense, and accept the decreased indirect costs. Also during the project, Contra Costa County Mosquito Vector Control

(CCCMVC) again will provide restoration work described near Shell Marsh, Point Edith, and Edith East, at no cost to CALFED. San Pablo Bay National Wildlife Refuge again will provide staff to manage the restoration, vegetation transplant, and bird monitoring at Tubbs Island. Time of commitment of funds: steadily throughout contract. Initial equipment purchases are balanced by phasing in additional time by personnel.

G. LOCAL INVOLVEMENT. Coordination with county and local governments. At each of our sites, land managers and neighbors are our partners in virtually every phase of the restoration to higher tidal action. This relationship holds even if most of the total expenses have been donated, rather than from CALFED. The land owners generally are the managers, except on state lands and Weapons Detachment Concord, used as reference sites, and managed largely by our partners at CCMVC. We also are coordinating our program with Ducks Unlimited, the Point Reyes Bird Observatory (North Bay), and Delta Science Center, particularly with current, related proposals by the Natural Heritage Institute for Marsh Creek Restoration and DWR on a feasibility study of benefits of restoration activities in Franks Tract, Big Break, and Lower Sherman Lake. Audubon Society plans to monitor waterbird populations at other sites of ours.

Our project partners in restoration have all neighboring landowner issues under control, for these restorations. US Fish and Wildlife Service has taken care of all permits and local concerns at Tubbs Island. CCMVC has handled all permitting at our marsh restorations at south Suisun Bay. Colleagues at East Bay Regional Park District anticipated these fiscal needs for permitting future restorations near Antioch (adjacent to our newly proposed reference sites, where we would provide necessary aquatic data). If their Board finds those funds unnecessary, CCMVC would propose to use those funds for analogous permitting and restorations slightly westward. We foresee no third-party negative impacts.

Public Outreach; Groups and Individuals affected by the Project.
Following agency approvals of our progress reports, we would continue public presentations largely through the university, such as at our recent Science Festival program. We share information with USF&WS and DFG (local fish monitoring, out of the Stockton office), IEP, and San Francisco Estuary Institute. Activities of all these programs/agencies/ organizations are compatible with CALFED objectives, and may become more collaborative through expanding our very useful Marsh Management Committee, begun at Shell (McNabney) Marsh with our colleagues at Mt. View Sanitary District, nearby.

H. COMPLIANCE WITH STANDARD TERMS AND CONDITIONS

Our group of colleagues, organizations, and other associates will comply with all state and federal standard terms. Those terms are consistent with State University policy. We have reviewed all terms contained in Attachments D (this PSP). As a state agency, only attachment D applies in our case, until a new contract will require the interagency agreements, probably as are in place in our present contract.

I. Literature Cited

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J. THRESHOLD REQUIREMENTS *Required documents are attached, as instructed.*

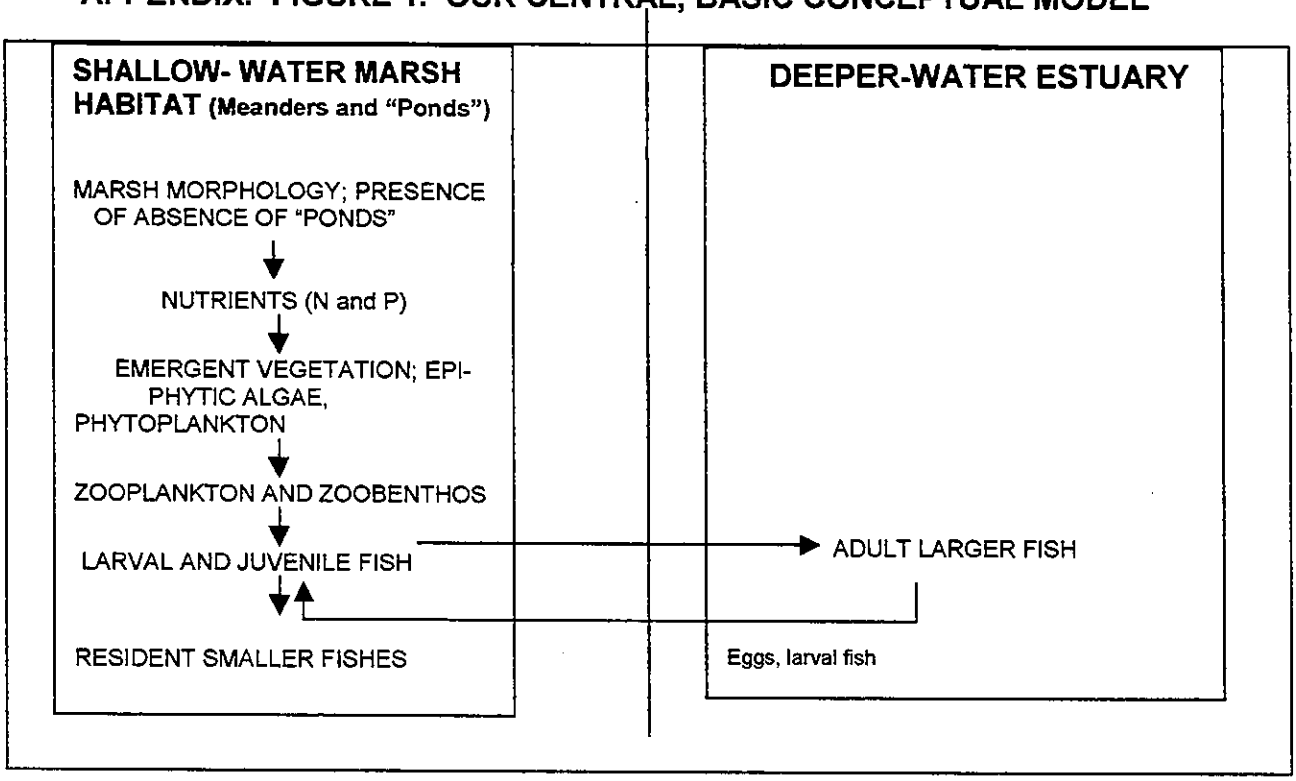
Table _. Digital Geographic Coordinates of Project Sites: (NAD 83, and see maps below):

Site	Action	N edge	S Edge	W Edge	E Edge
Tubbs Island	Increase Tide Action and ponds	N38deg 7.63'	N38deg 7.02'	W122deg 27.00'	W122deg 25.95'
Shell/ McNabney Marsh	Increase Tide Action and ponds	N38deg 1.95'	N38deg 1.15'	W122deg 6.83'	W122deg 5.55'
Pt Edith	Connect Ponds	N38deg 3.17'	N38deg 2.90'	W122deg 4.11'	W122deg 3.98'
Edith East	Major pond to attach to channel: (e.g. location)	N38deg 2.61'	N38deg 2.30'	W122deg 4.1'	W122deg 3.90'
Big Break	Reference Sites/ RestorationPermit prep	N38deg 0.75'	N38deg 0.53'	W121deg 43.75'	W121deg 43.44'

Geographic Coordiates of Project Sites ***Center*** *Points*: (attached, with maps in appendix)

Site	Action	Size	Centered at: N Latitude	W Longitude
Tubbs Island	Increase Tide Action and ponds	250 acres	N38deg 7.31'	W122deg 26.51'
Shell/ McNabney Marsh	Increase Tide Action and ponds	200 acres	N38deg 1.64'	W122deg 6.21'
Pt Edith	Connect Ponds	100 acres	N38deg 3.04'	W122deg 4.05'
Edith East:	Major pond to attach to channel (e.g.):	200 acres	N 38deg 2.52'	W 122deg 4.0'
Big Break	Reference Sites/ RestorationPermit preparations	?	N38deg 0.63'	W 121deg 43.56'

APPENDIX. FIGURE 1. OUR CENTRAL, BASIC CONCEPTUAL MODEL



APPENDIX II. PROJECT PROGRESS AND STATUS

(*CALFED* Coop Agreement # 114209J018.)

Project Description. Our project has begun to identify and improve those factors (including physical, chemical, geomorphic, and biological) which are limiting in tidal marsh restoration efforts in the North Bay/Suisun Bay Ecological Zone (CALFED Management Zone 2) of the San Francisco Estuary, particularly those that limit native fish populations. Our work performed in reference and restored marshes, in conjunction with our collaborators at US Fish and Wildlife Service Refuge in North San Pablo Bay (Tubbs Island), Contra Costa Mosquito and Vector Control in Southern Suisun Bay (Pt Edith area, McNabney/Shell Marsh, and the(Concord Weapons Detachment), monitors and compares reference and restored marshes (see attached data sheet for items monitored) before, during, and after restoration to greater tidal action. We advise and assist our collaborators on improving restoration and maintenance/ management of marshes to increase invertebrate and native fish populations, create nurseries for native migratory fishes, and through this adaptive management, detect and correct ecological limiting factors or "bottlenecks," both in marshes being restored and reference sites (degraded pre-restoration sites, or relatively natural marshes). See attached maps for marsh locations.

Scientific Merit of the Project. Our overarching, testable hypothesis is that particular conditions in our reference and restoration marshes will correspond with differing population densities of resident fishes, and that rates of colonization of our shallow-water marsh restorations by larval and juvenile fishes whose adults live in deeper areas of the Estuary (specifically delta smelt and splittail) will tend to improve through time in marshes with those suitable conditions. A related hypothesis, that relatively pristine reference marshes would tend to have higher population densities of fishes and invertebrates than in analogous restored marshes, is being clearly rejected thus far. Putative pristine estuary marshes to date have quite consistently shown relatively few fishes and invertebrates. A diagrammatic, basic conceptual model of our project is shown in Figure 1 (attached). In theory, each trophic level passes the necessary nutrients and energy to the next level, producing a "healthy" shallow-water marsh habitat, with sufficient nutrients present

for primary productivity, and with a healthy primary and secondary (zooplankton and zoobenthos) productivity in place to ensure food for both resident fishes, and for larval and juvenile fish whose adults inhabit the deeper water areas of the estuary. If there are insufficient zooplankton and/or zoobenthos to sustain native larval and juvenile fish, for example, energy flow within the system is stifled, and as a result, native fish populations will suffer or be absent. As energy passes from one level to the next, other limiting factors may come into play, such as flow and channel dynamics. All these factors, as appropriate, are included for observation, study, and change or modification through adaptive management. Through monitoring, each trophic level will be assessed as to whether limiting factors or bottlenecks are at work during the restoration process. We will advise our partners and collaborators how these limiting factors appear to be minimized through the use of adaptive management practices.

Current Status of the Project. Our four sets of shallow-water marsh habitat sites, plus an additional deeper reference site added later (and not formally funded), span an array of mesohaline to oligohaline environmental conditions in CALFED Ecological Zone 2. During February-April, 2000, as we have reported to CALFED, USF&WS, and DFG, we detected relatively large population densities of our target fish species, delta smelt and splittail. *Delta smelt:* We sampled (and released live) numerous juvenile delta smelt at the north San Pablo Bay (Tubbs Is.) in spring 2000. This site was restored one year earlier to somewhat higher tidal action (although excavations are now silting in). Systematic, short-distance plankton tows detected ~20-mm-long delta smelt juveniles at ~8/m^3 and <~15-mm-long postlarvae at ~32/m^3. These delta smelt appeared recently (February- April) for at least several weeks in upper and lower sites in the "muted marsh" on Tubbs Island, North San Pablo Bay. We also found them present, but less common, at two or our three analogous sites, only. All these sites are very shallow water (~1 m at high tide). In March-April, 1999, DFG detected numerous delta smelt juveniles (~20mm long) in the nearby Napa River, while our Tubbs Island marsh sampling yielded only ~1 individual at that time (along with higher zooplankton densities than in March, 2000). We also have been removing (and apparently reducing numbers of) a large population of invasive yellowfin goby at Tubbs Island and in other marshes. This introduced species is a potential predator on delta smelt larvae and juveniles. Our Y2000 population densities (~8/m^3) of ~20mm-long delta smelt juvenile at Tubbs I., ascertained with non-destructive methods, apparently exceed by >500X the maximum densities reported in DFG's Bay/Delta sampling for juvenile delta smelt (DFG sampled in more open, deeper water). We also sampled (and released) several delta smelt postlarvae at our previously restored Weapons Detachment Concord site in March, 2000. *Splittail:* Near Concord in Suisun Bay, we trawled (then released) five adult splittail (per 500 m^3), and three other fish species, in our deeper reference site (a 2m-deep slough, at a creek mouth), and one adult splittail (plus one other species, per 500 m^3) in a 3-m deep slough, just outside our restored sites. Our routine fyke netting also revealed splittail at two of our three marshes with ponds: one juvenile splittail at our North San Pablo Bay site (at Tubbs Island), which had received increased tidal action one year earlier) plus five adult splittail at one of our Concord marshes (with muted tides and permanent ponds along the channel). As with delta smelt, our adult splittail population densities exceed previous data by ~50X (including data for juveniles). We are continually integrating and interpreting our other monitored data, including physical data, zooplankton and zoobenthos, and heavy metals data, related to our targeted fishes and their food webs. For example, to date, marshes with higher densities of zooplankton and zoobenthos also have shown higher fish total populations, and one marsh with a large ponded, shallow-water expanse (Shell Marsh) has the highest animal population densities and diversities among all our marshes (including bird populations and species), although this marsh also has a high level of nutrient input (originating from birds *and* reclaimed water flow from a nearby treatment plant and marsh). Some reference and restored sites sampled, particularly those without ponds along channels, have yielded virtually no plankton or native fishes in our

comparative sampling. Also, in our metals sampling and analysis program (at present funded at only one site), analyses of animal tissue have shown concentrations of mercury at marginally high levels (7 ppm) in adult mitten crab and yellowfin gobies sampled from northern San Pablo Bay marsh, even though the marsh sediments and water do not show correspondingly high levels of metals, including mercury. These animals may be migrating through other, mercury-contaminated regions, or biomagnifying metals up the food web.

Current Status of Project, Accomplishments to Date, Information Generated. The project is proceeding as planned. See CALFED accomplishments to data (Table 2, attached). A list of our major findings and resulting actions (improved restorations) is attached in the appendix, with bibliography, and a table of fishes (ranked by population densities) we have detected to date. For information generated, see "List of References" of papers written, and other material generated based on CALFED Phase I results to data.

Fiscal Status, Regulatory Issues. Fiscally, our project is proceeding as planned, and we have no outstanding fiscal issues.. Last year (1999), we had to increase tidal amplitude at an alternative Tubbs Island site, just west of where originally planned, to allow time to manage salt marsh harvest mouse populations prior to restoration of tidal action. We have no more outstanding regulatory nor implementation issues

Data Collection and Monitoring Program. Data collected by each PI is entered into a Microsoft Excel datasheet. Monitoring and data analysis forms the heart of our program, and is carried out on an ongoing basis (see sample data sheet attached). We present our results in team meetings, to local agencies, in CALFED quarterly and annual reports, and at scientific meetings. Manuscripts based on this material will be submitted for publication in the refereed scientific and habitat management literature.

Table_. "**List of References**." Partial bibliography of CALFED progress from the present half of Phase 1, acknowledging CALFED.

Diego, C., M. Sugiura, S.G. Riddle, J.C. Andrews. Heavy Metals in the Tubbs Island Restoration Area. Abstract for the American Chemical Society National Meeting, San Francisco, April, 2000, with poster presentations also at CSUH and at the Am Chem Soc Undergraduate Research Conference in May, 2000.

Kitting, C.L. 1999. Small fishes and their foods, compared among restored and reference marshes in northern San Francisco Bay. Western Soc. Naturalists Abstract. Monterey, CA 12/99

Kitting, C.L. April, 2000. CSUH Aquatic Ecology Programs on the Delta: Current Events. Poster Session and live specimens for CSUH Science Festival.

Kitting, C.L. July, 2000. Pulmonate mollusca persisting in California Delta marshes with high tidal and physical/chemical extremes. Oral Presentation – American Malacological Society / Western Society of Malocologists Annual Conference

Kitting, C.L. August, 2000. Epibenthic animal colonization of restored and reference marshes in San Francisco Estuary, California. for Millennium International Wetlands Conference, Quebec, with Society of Wetlands Scientists, and others.

Kitting, August, 2000. Contributed illustrations and captions for "Wetlands Scientists at Work" display, for Millennium International Wetlands Conference, Quebec, with Society of Wetlands Scientists, and others.

Kitting et al., October, 2000. Physical and biological environment of dense Delta smelt and splittail populations on the outer California Delta. CALFED conference Oral Presentation Planned, Sacramento.

Kitting, C.L. October, 2000. Overview of marshes before, during, and after restoration to increased tidal amplitude. CALFED Conference poster planned, Sacramento.

Malamud-Roam, K. and L A. Hanson (upcoming) Distribution and abundance on invasive vegetation in response to tidal enhancement of low-salinity marshes. Planned for upcoming conferences.

Related progress from CSUH, in support of this CALFED project, also acknowledging CALFED:

Rees, J.T. and C.L. Kitting. 1999. Pilot survey of gelatinous zooplankton in the San Francisco Estuary. IEP Newsletter (and website)12(3): 4-5.
(website: www.iep.ca.gov/report/newsletter/1999summer/body.html)

Rees, J. T. 1999 Non-indigenous jellyfish in the Upper San Francisco Estuary: Potential impact on zooplankton and fish. IEP Newsletter 12(3):46-50

Rees, J. T. and C. L. Kitting. 2000. Seasonal comparison of introduced gelatinous zooplankton from San Francisco Bay to the Delta. IEP Newsletter 13(1):9-10.

Rees, J. T. and L. A. Gershwin, (2000). Non-indigneous hydromedusae in California's upper San Francisco Estuary: life cycles, distribution, and potential environmental impacts. Sciencia Marina. (in press)

Rees, J. and C. Kitting. 2000. Survey of Gelatinous Zooplankton ("Jellyfish") in the San Francisco Estuary: Annotated Species Checklist, Historical Records, and Initial Field Survey. (In Review, IEP Technical Report.)

Appendix Table 2. Progress in Phase 1, cont.

Some of the Major Findings and Actions during First 1.4 yr of 2.5-yr CALFED PROJECT: Comparative monitoring of tidal brackish-water marshes. (Most results have been noted previously in our quarterly CALFED reports, and presented at various agency meetings.)

X indicates that the finding or action directly effects selected CALFED goals or concerns

Finding and Action	Restoration	Monitoring	Species of Concern	Contaminants	Introduced Species
1. Innovative logistics and sampling gear for sampling physical and biological features of sites makes detailed, non-destructive comparative data acquisition more efficient and practical.		X			
2. Flood Control Structure's debris screen was modified to allow fish to pass. More sections are proposed to be redesigned or removed.	X		X		
3. Saltmarsh restorations during wet winters accumulate more invasive plants, less tolerant of salt conditions (based on CCMVC team, Malamud-Roam	X				X

and Hanson					
4. Invasive plants begin colonizing restorations in a small enough patch to eradicate, until native vegetation can become established (based on CCMVC team).	X				X
5. Stinging estuarine hydroids, apparently introduced and harmful to small aquatic animals, overgrow various structures near swift currents, such as large pipes through levies. Hydroids are being removed frequently, pipes were replaced, but hydroids recolonize rapidly. Minimizing surface areas of structures, and using larger marsh openings (less current, less surface-to-volume ratio) may decrease the hydroid problem.	X	X			X
6. Stinging jellyfish in brackish water, two to three invasive spp from the Black Sea, described in Rees and Kitting (2000), occur in SF Estuary during late summer through early fall, and become very common in open water, but rarely invade local marshes. Marshes may tear jellyfish gelatinous tissues, and destroy these small (< ~3cm) jellyfish.	X	X	X		X
7. Sediments accumulate largely from sediment flow along the bottom, rather than from settlement. Thus, marsh openings to the bay should be enlarged where sediments are less likely to flow back. Any sediment removal must be widespread enough to prevent rapid sediment from sloughing back.	X			X	
8. Low metal contamination occurred in water and sediments of both marshes tested; Yellowfin goby and mitten crabs showed higher levels of contaminants.			X	X	
9. Summer fish kills were detected at both poorly circulated marsh sites (low tidal amplitude, pre-restoration), so we arranged to open channels. Fishes appear to be recovering slowly, with increased tidal flux.	X	X	X		
10. At a eutrophic site (from #9) isolated from tide action, we allowed more tidal action past contaminated sediments; because contaminants did not increase in the marsh nearby. More flow and metals monitoring is proposed.	X			X	
11. We relieved channel blockage at vulnerable petroleum pipes, covered with cattails, by opening suddenly a tide gate at high tide, using the water pressure to burst through and erode out some of the plants.					
12. Aquatic animals, including adult splittail and juvenile delta smelt, are rarer in reference (relatively natural) or restored marshes unless permanent "ponds," attached to the tidal channels, are present. We propose to connect currently isolated ponds to recently restored (and natural) channels (this proposal).	X	X	X		
13. Minnow trap samplers on the bottom can accumulate many yellowfin goby (and small cameleon goby, native sculpin, invertebrates, etc.) live, but population densities of gobies may begin to be depleted after a year of monthly yellowfin goby removal, at least where tidal migration brings them into contact with our live fish traps.		X			X

14. We found juvenile delta smelt on incoming and outgoing tides throughout one of our two rich marshes at 5ppt salinity during February-March, reaching very high densities; these fish taken in our routine, non-destructive, small-scale plankton samples, one year after increased tidal amplitude and yellowfin goby removal. The presence of juvenile delta smelt both outside and inside the marsh suggest that the of *mouths* of tidal creeks, along with quiet bay inlets, are important habitats for these fish. Intensive monitoring at these locales vs. elsewhere suggests conditions attractive to delta smelt larvae.	X	X	X		
15. Adult splittail have been found in deeper water (2-3 m), so deeper marsh channels are proposed.	X	X	X		
16. Otters and beaver were discover and frequently observed at our Suisun Bay sites, plus additional muskrat and turtles at one site (McNabney Marsh, Martinez). The latter is our only eutrophic site, thus far. A beaver lodge elsewhere apparently blocked a restored tidal creek recently. The creek is proposed here to be re-routed (through a nearby, isolated pond, with wiers to maintain the pond. Frogs also are heard near most of our marshes despite the brackish water.	X	X			
17. Patches of unusually tall pickleweed were detected at a pre-restoration site. The pickleweed will be salvaged (and placed on nearby, new levy intertidally) before levy setback and new shoreline marsh restoration.	X				
18. Unusually dense populations of salt marsh harvest mouse were detected before restoration to tidal action at a restoration site in North San Pablo Bay. (based on McGinnis monitoring.) Levy breach will be gradual, at night, with new intertidal habitat provided in advance, in case it is necessary to improve migration ability of the salt marsh harvest mouse population.	X	X	X		
19. Bird populations in a pre-restoration area are less abundant and diverse than in adjacent marshes restored to higher tide action (based on SPBNWR joint monitoring staff, Vicencio and Eagan).	X	X			

Appendix Table _3_. North San Francisco Bay / Outer Delta Marsh Sites: Major Species of Small (and juvenile) Fishes, in approximate order of abundance in CSUH CALFED marsh monitoring: (* indicates recruitment detected in restored marshes) - Kitting, Gaos, et al.

Common Name	Species or taxa	Reported Spawning Salinity (ppt)	Reported Spawning Temperature (Celsius
1.* Inland Silverside	Menidia beryllina	Freshwater - Brackish	13.2 - 34.2
2.* Mosqitofish	Gambusia affinis	Brackish, mostly Freshwater	15 (- 30)
3.* Threespine Stickleback	Gasterosteus aculeatus	Freshwater - Brackish	15 – 19
4. Chameleon Goby	Tridentiger trigonecephalus	Brackish - Seawater	~ 20
5.* Prickley Sculpin	Cottus asper	fresh - brackish	8 -13

6.* Staghorn Sculpin	Leptocottus armatus	Brackish - Seawater	9 - 15.2
7.* Topsmelt	Atherinops affinis	Freshwater - Brackish	10 – 25
(patchy:)			
8.* Delta Smelt	Hypomesus transpacificus	Freshwater	7 - 15
9.* Splittail	Pogonichthys macrolepidotus	Freshwater - Brackish	9 - 20
10. Sacramento Squawfish = Pike Minnow	Ptychocheilus grandis	Freshwater	15.6 +
11. Fathead Minnow (isolated occurrence:)	Pimephates promelas	Freshwater	14 +
12. Striped Bass	Morone saxatilis	Brackish –Fresh, mostly Tidal freshwater	14.4 – 23.9
13.* Chinook Salmon =King Salmon	Oncorhynchus tshawytscha	Brackish - Seawater (up to 12 ppt)	10 – 14
14. Threadfin Shad	Dorosoma petenense	Freshwater	14 – 18
15. White Sturgeon	Acipenser transmontanus	Freshwater	8 – 22 , mostly 14-15
Plus: Sunfishes	Centrarchidae	Freshwater	N/A
Brown Bullhead	Ictalurus nebulosus	Freshwater	21 – 25

Ranges based on McGinnis, Samuel M. (1984). Freshwater Fishes of California. UC Berkeley Press.
and Wang, Johnson C.S. (1986). Fishes of the Sacramento-San Joaquin Estuary. Technical Report 9 for Interagency Ecological Study Program. DWR.

Also anticipated to become readily detectable locally:

Hitch	Lavinia exilicauda	Freshwater	14 - 18
Sacramento Blackfish	Orthodon microlepidotus	Freshwater	12 - 24
Longfin Smelt	Spirinchus thaleichthys	Freshwater	7 - 14.5
Wakasagi Smelt	Hypomesus nipponensis	Freshwater	N/A
Green Sturgeon	Acipenser medirostiris	Freshwater	8 ~ 22

· follows p. 24 :

Year one

Proposed CALFED budget through CSUH Foundation. Year One. Feb 1, 2001 - Jan, 2002.					
(phased in as previous phase is completed by September, 2001)					
TASK 1 (required for any of project) Project Initiation, Supervision, and General Reporting.			**MATCH**		
Salaries		**REQUEST**	(from CSUH unless noted)	**TOTAL**	
Chris Kitting	1/6 time x 1 Acad. qtr	4,785		4,785	
($28,710/qtr)x3	Match: 1/12 time x 1 Acad. qtr		2,393	2,393	
	0.2 time x Summer/overload/qtr breaks	5,742		5,742	
John Rees	1/8 time max. x 11 months	10,432		10,432	
($22,761/qtr)x4	or Associate				
Assistance	2 x $10~15/hr x 4 hr/wk x 44 weeks	4,224		4,224	
Fringe Benefits					
Chris Kitting	Academic year release rate = 37%	1,770		1,770	
	Academic year release rate = 37%		885	885	
	Summer/overload rate = 10%	574		574	
John Rees	Adjunct faculty rate = 10%	1,043		1,043	
or Associate					
Assistance	Student benefit rate = 10%	422		422	
Subtotal, Salaries, Wages and Benefits:		**28,993**	**3,278**	**32,271**	
Other Direct Costs (Task 1)					
Travel expenses to CALFED and related meetings		800		800	
General publication costs, including illustrations		1,200		1,200	
Subtotal, Other Direct Costs, Task 1		***2,000***	***0***	***2,000***	
Total Direct Costs, Task 1		30,993	885	34,271	
Indirect Costs (25% of total direct costs)		7,748	7,419	15,167	
CSUH negotiated Federal rate is 47% of salaries, wages & benefits.					
The University will provide an additional match as unrecovered indirect costs.					
		REQUEST	**MATCH**	**TOTAL**	
Total, Task 1		**38,742**	**8,304**	**49,439**	
TASK 2: Pilot and Major Marsh Community Restoration (and Extra Reporting)					
Salaries		**REQUEST**	**MATCH**	**TOTAL**	
Chris Kitting	1/3 time x 2 Acad. qtr	19,140		19,140	
($28,710/qtr)x3	Match: 1/6 time x 1 Acad. qtr		9,570	9,570	
incl.SrFac.SalGap	0.3 time x Summer/overload/qtr breaks	8,613		8,613	
	(throughout, as in article 36 of CSU contract)				
John Rees	1/5 time max. x 11 months	16,691		16,691	
($22,761/qtr)x4	or Associate				
Student Asst.	2 x $10~15/hr x 6.5 hr/wk x 44 weeks	6,864		6,864	
Technical Asst.	1 x $20/hr x 13 hr/wk x 44 weeks	11,440		11,440	
Fringe Benefits					

	Chris Kitting	Academic year release rate = 37%	7,082		7,082	
		Academic year release rate = 37%		3,541	3,541	
		Summer/overload rate = 10%	861		861	
	John Rees	Adjunct faculty rate = 10%	1,669		1,669	
	or Associate					
	Student Asst.	Student benefit rate = 10%	686		686	
	Technical Asst.	Part-time benefit rate = 37%	4,233		4,233	
Subtotal, Salaries, Wages and Benefits:			***77,280***	***13,111***	***90,391***	
Other Direct Costs (Task 2)						
	Connecting Restored Channels to Ponds via wiers		0	$140,000 (CCM	140,000 (CCMVC)	
	Equipment and supplies		3,600		3,600	
	Repairs		1,500		1,500	
	Transportation Costs & boat use		2,000		2,000	
*	Remote lab use ($700/mo x 4 mo)		2,800		2,800	
	Plant and animal acquisition		8,000		8,000	
	Plant salvage and transplant expenses, SPBNWR		9,775	$1,200 (SPBay)	9,775	
	E.Bay Regional Pks (orCCMVC) permitting expenses-partia		23,000		23,000	
	(for Delta shore restoration pilot, partial cost)					
*	Remote Lab expenses (communications, copies)		1,300		1,300	
	Publication costs		330		330	
Subtotal, Other Direct Costs			***52,305***	***141,200***	***193,505***	
Total Direct Costs, Task 2			129,585	154,311	283,896	
Indirect Costs (25% of total direct costs)			32,396	10,088	42,484	
	CSUH Federal rate is 47% of salaries, wages & benefits.					
	The University will provide an additional match as unrecovered indirect costs.					
			REQUEST	**MATCH**	**TOTAL**	
Total, Task 2			**161,981**	**164,399**	**326,380**	
TASK 3: Physical and Biological Comparative Monitoring of Marsh Treatments						
(and Extra Reporting)						
Salaries			**REQUEST**	**MATCH**	**TOTAL**	
	Chris Kitting	1/3 time x 1 Acad. qtr	9,667		9,667	
	($28,710/qtr)x3	Match: 1/6 time x 1 Acad. qtr		4,833	4,833	
	incl.SrFacSalGap	0.5 time x Summer/overload/qtr breaks	14,500		14,500	
	John Rees	1/3 time max. x 11 months	27,819		27,819	
	($22,761/qtr)x4	or Associate				
	Sam McGinnis	stipend @ previous rate+<10%gap	24,000		24,000	
	(Professor Emeritus) Contra Costa/ and Associate at SP Bay					
	Tech Assist.	3 x ~$10/hr x 6.5 hr/wk x 44 weeks	8,580		8,580	
	Student Assist.	~$12/hr x 10 hr/wk x 44 weeks	5,280		5,280	
Fringe Benefits						
	Chris Kitting	Academic year release rate = 37%	3,577		3,577	
		Academic year release rate = 37%		1,788	1,788	
		Summer/overload rate = 10%	1,450		1,450	

	Sam McGinnis	Summer/overload rate = 10%	2,400		2,400
	/Associate				
	John Rees	Adjunct faculty rate = 10%	2,782		2,782
	or Associate				
	Student Assist.	Student benefit rate = 10%	858		858
	Technical Assist.	Part-time benefit rate = 37%	4,151		4,151
	Lab Assist.	Student benefit rate = 10%	528		528
Subtotal, Salaries, Wages and Benefits:			***105,592***	***6,621***	***112,213***
Other Direct Costs (Task 3)					
	Contra Costa Vegetation monitoring and management				
		(for CCMVC, incl staff @<$26 /hr)	35,500		35,500
	Tubbs Island Bird Monitoring (for SF Bay Wildlife Society/		11,220		11,220
	/Friends of San Pablo Bay, incl staff @ <$17/hr)				
	Tubbs Island Vegetation Monitoring (for SF Bay Wildlife So		1,757	480	2,237
	/Friends of San Pablo Bay, incl staff @ $18-30/hr)				
	2 YSI underwater data loggers with O2 electrodes		6,000		6,000
	Field Equipment, replacement, supplies, repairs, and safety		2,400		2,400
	Transportation Costs		2,500		2,500
	Boat use, partial cost		4,000		4,000
*	Remote lab use ($700/mo x 4 mo), partial cost		2,800		2,800
*	Remote lab expenses (communication, copies, modificatior		3,500		3,500
	scanner and portable computer		2,400		2,400
	Publication and illustration partial costs		900		900
Subtotal, Other Direct Costs			***72,977***	***480***	***73,457***
Total Direct Costs, Task 3			178,569	7,101	185,670
Indirect Costs (25% of total direct costs)			44,642	8,098	52,740
	CSUH Federal rate is 47% of salaries, wages & benefits.				
	The University will provide an additional match as unrecovered indirect costs.				
			REQUEST	**MATCH**	**TOTAL**
Total, Task 3			**223,211**	**15,199**	**238,410**
TASK 4: Chemical (N,K,C, toxic metals) Monitoring of Water, Sediments,					
	and Major Plants and Animals (and Extra Reporting)				
Salaries			**REQUEST**	**MATCH**	**TOTAL**
	Joy Andrews	1/6 time x 3 Acad. qtr	9,457		9,457
	($18,914/qtr)x3	Match: 1/6 time x 3 Acad. qtr		9,457	9,457
	John Rees	1/24 time x 11 months	3,477		3,477
	$22,761/qtrx4	or Associate			
	Chris Kitting	1/6 time x 1 Acad. qtr	4,785		4,785
	($28,710/qtr)x3	Match: 1/12 time x 1 Acad. qtr		2,393	2,393
	incl.SrFacSalGap				
	Student Asst.	2 x ~$11/hr x 14 hr/wk x 44 weeks	13,552		13,552
Fringe Benefits					
	Joy Andrews	Academic year release rate = 37%	3,499		3,499
		Academic year release rate = 37%		3,499	3,499
	John Rees	Adjunct faculty rate = 10%	348		348
	or Associate				

	Chris Kitting	Academic year release rate = 37%	1,770		1,770	
		Academic year release rate = 37%		885	885	
	Student Asst.	Student benefit rate = 10%	1,355		1,355	
Subtotal, Salaries, Wages and Benefits:			***38,244***	***16,234***	***54,478***	
Other Direct Costs (Task 4)						
	Hach carbon analyzer and supplies		5,800		5,800	
*	Repairs and AA (metals analysis) supplies		4,500		4,500	
	microwave digester (for metals analysis)		10,900	10,900	21,800	
	Transportation Costs/boat use		1,000		1,000	
	Publication costs		540		540	
Subtotal, Other Direct Costs			***22,740***		***22,740***	
Total Direct Costs, Task 4			60,984	16,234	77,218	
Indirect Costs (25% of total direct costs)			15,246	10,359	25,605	
	CSUH Federal rate is 47% of salaries, wages & benefits.					
	The University will provide an additional match as unrecovered indirect costs.					
			REQUEST	**MATCH**	**TOTAL**	
Total, Task 4			**76,230**	**26,592**	**102,822**	
			REQUEST	**MATCH**	**TOTAL**	
GRAND TOTAL, YEAR ONE			**500,163**	**206,191**	**706,354**	
We propose that up to 10% of each item be allowed to be reallocated to another category if necessary, with no change in final cost contracted.						
*	*Operations and Maintenance budget item.*					

Proposed CALFED budget through CSUH Foundation. Year Two. Jan 1, 2002 - Dec 31, 2002.				
TASK 1 (required for any of project) Project Initiation, Supervision, and General Reporting.			**MATCH**	
Salaries		**REQUEST**	(from CSUH unless noted)	**TOTAL**
Chris Kitting	1/6 time x 2 Acad. qtr	10,240		10,240
($30,720/qtr)x3	Match: 1/12 time x 2 Acad. qtr		5,120	5,120
incl.SrFac.SalGap	0.2 time x Summer/overload/qtr breaks	6,144		6,144
John Rees	1/8 time max. x 12 months	11,950		11,950
($23,900/qtr)x4	or Associate			
Assistance	2 x $10~15/hr x 4 hr/wk x 44 weeks	4,576		4,576
Fringe Benefits				
Chris Kitting	Academic year release rate = 37%	3,789		3,789
	Academic year release rate = 37%		1,894	1,894
	Summer/overload rate = 10%	614		614
John Rees	Adjunct faculty rate = 10%	1,195		1,195
or Associate				
Assistance	Student benefit rate = 10%	458		458
Subtotal, Salaries, Wages and Benefits:		**38,966**	**7,014**	**45,980**
Other Direct Costs (Task 1)				
Travel expenses to CALFED and related meetings		1,800		1,800
General publication costs, including illustrations		1,500		1,500
Subtotal, Other Direct Costs, Task 1		***3,300***	***0***	***3,300***
Total Direct Costs, Task 1		42,266	1,894	49,280
Indirect Costs (25% of total direct costs)		10,566	11,044	21,611
CSUH negotiated Federal rate is 47% of salaries, wages & benefits.				
The University will provide an additional match as unrecovered indirect costs.				
		REQUEST	**MATCH**	**TOTAL**
Total, Task 1		**52,832**	**12,939**	**70,891**
TASK 2: Pilot and Major Marsh Community Restoration (and Extra Reporting)				
Salaries		**REQUEST**	**MATCH**	**TOTAL**
Chris Kitting	1/3 time x 1 Acad. qtr	10,240		10,240
($30,720/qtr)x3	Match: 1/6 time x 1 Acad. qtr		5,120	5,120
incl.SrFac.SalGap	0.3 time x Summer/overload/qtr breaks	9,216		9,216
	(throughout, as in article 36 of CSU contract)			
John Rees	1/5 time max. x 12 months	19,120		19,120
($23,900/qtr)x4	or Associate			
Student Asst.	2 x $10~15/hr x 6.5 hr/wk x 44 weeks	6,864		6,864
Technical Asst.	1 x $20/hr x 13 hr/wk x 44 weeks	11,440		11,440
Fringe Benefits				
Chris Kitting	Academic year release rate = 37%	3,789		3,789

		Academic year release rate = 37%		1,894	1,894
		Summer/overload rate = 10%	922		922
	John Rees	Adjunct faculty rate = 10%	1,912		1,912
	or Associate				
	Student Asst.	Student benefit rate = 10%	686		686
	Technical Asst.	Part-time benefit rate = 37%	4,233		4,233
Subtotal, Salaries, Wages and Benefits:			***68,422***	***7,014***	***75,436***
Other Direct Costs (Task 2)					
	Equipment and supplies		3,600		3,600
	Repairs		1,500		1,500
	Transportation Costs & boat use		2,000		2,000
*	Remote lab use ($700/mo x 4 mo)		2,800		2,800
	Plant and animal acquisition		8,000		8,000
	E.Bay Regional Pks (orCCMVC) permitting expenses-partial		18,000		18,000
	(for Delta shore restoration pilot, partial cost)				
*	Remote Lab expenses (communications, copies)		1,300		1,300
	Publication costs		330		330
Subtotal, Other Direct Costs			***37,530***		***37,530***
Total Direct Costs, Task 2			105,952	7,014	112,966
Indirect Costs (25% of total direct costs)			26,488	8,967	35,455
	CSUH Federal rate is 47% of salaries, wages & benefits.				
	The University will provide an additional match as unrecovered indirect costs.				
			REQUEST	**MATCH**	**TOTAL**
Total, Task 2			**132,440**	**15,981**	**148,421**
TASK 3: Physical and Biological Comparative Monitoring of Marsh Treatments					
(and Extra Reporting)					
Salaries			**REQUEST**	**MATCH**	**TOTAL**
	Chris Kitting	1/3 time x 3 Acad. qtr	30,720		30,720
	($30,720/qtr)x3	Match: 1/6 time x 3 Acad. qtr		20,480	20,480
	incl.SrFacSalGap	0.5 time x Summer/overload/qtr breaks	15,360		15,360
	John Rees	1/2 time max. x 12 months	47,800		47,800
	($23,900/qtr)x4	or Associate			
	Sam McGinnis	stipend @ previous rate+<10%gap	25,200		25,200
	(Professor Emeritus)	Contra Costa/ and Associate at SP Bay			
	Student Assist.	3 x ~$11/hr x 6.5 hr/wk x 44 weeks	9,438		9,438
	Lab Assist.	~$10/hr x 10 hr/wk x 44 weeks	4,400		4,400
Fringe Benefits					
	Chris Kitting	Academic year release rate = 37%	11,366		11,366
		Academic year release rate = 37%		7,578	7,578
		Summer/overload rate = 10%	1,536		1,536
	Sam McGinnis	Summer/overload rate = 10%	2,520		2,520
	/Associate				

	John Rees	Adjunct faculty rate = 10%	4,780		4,780
	or Associate				
	Student Assist.	Student benefit rate = 10%	944		944
	Technical Assist.	Part-time benefit rate = 37%	6,105		6,105
	Lab Assist.	Student benefit rate = 10%	440		440
Subtotal, Salaries, Wages and Benefits:			***160,609***	***28,058***	***188,667***
Other Direct Costs (Task 3)					
	Contra Costa Vegetation monitoring and management				
		(for CCMVC, incl staff @<$28 /hr)	38,500		38,500
	Tubbs Island Bird Monitoring (for SF Bay Wildlife Society/		16,500		16,500
	/Friends of San Pablo Bay, incl staff @ <~$20/hr)				
	Tubbs Island Vegetation Monitoring (for SF Bay Wildlife Socie		1,861	510	2,371
	/Friends of San Pablo Bay, incl staff @ $19-32/hr)				
	Field Equipment, replacement, supplies, repairs, and safety ge		4,400		4,400
	Transportation Costs		2,500		2,500
	Boat use, partial cost		6,000		6,000
*	Remote lab space ($700/mo x 8 mo), partial cost		5,600		5,600
*	Remote lab expenses (communication, copies, modifications)		4,300		4,300
	replacement/repair equipment		2,400		2,400
	Publication and illustration partial costs		900		900
Subtotal, Other Direct Costs			***82,961***	***510***	***83,471***
Total Direct Costs, Task 3			243,570	28,568	272,138
Indirect Costs (25% of total direct costs)			60,892	27,781	88,673
	CSUH Federal rate is 47% of salaries, wages & benefits.				
	The University will provide an additional match as unrecovered indirect costs.				
			REQUEST	**MATCH**	**TOTAL**
Total, Task 3			**304,462**	**56,349**	**360,811**
TASK 4: Chemical (N,K,C, toxic metals) Monitoring of Water, Sediments,					
	and Major Plants and Animals (and Extra Reporting)				
Salaries			**REQUEST**	**MATCH**	**TOTAL**
	Joy Andrews	1/6 time x 3 Acad. qtr	9,930		9,930
	($19,860/qtr)x3	Match: 1/6 time x 3 Acad. qtr		9,930	9,930
	John Rees	1/24 time x 12 months	3,983		3,983
	($23,900/qtr)x4	or Associate			
	Chris Kitting	1/6 time x 1 Acad. qtr	5,120		5,120
	($30,720/qtr)x3	Match: 1/12 time x 1 Acad. qtr		2,560	2,560
	incl.SrFacSalGap				
	Student Asst.	2 x $12/hr x 14 hr/wk x 44 weeks	14,784		14,784
Fringe Benefits					
	Joy Andrews	Academic year release rate = 37%	3,674		3,674
		Academic year release rate = 37%		3,674	3,674
	John Rees	Adjunct faculty rate = 10%	398		398
	or Associate				
	Chris Kitting	Academic year release rate = 37%	1,894		1,894
		Academic year release rate = 37%		947	947
	Student Asst.	Student benefit rate = 10%	1,478		1,478

Subtotal, Salaries, Wages and Benefits:		***41,263***	***17,111***	***58,374***
Other Direct Costs (Task 4)				
	carbon and nutrient analyzer supplies	4,800		4,800
*	Repairs and AA (metals analysis) supplies	2,500		2,500
	Transportation Costs/boat use	1,000		1,000
	Publication costs	540		540
Subtotal, Other Direct Costs		***8,840***		***8,840***
Total Direct Costs, Task 4		50,103	17,111	67,214
Indirect Costs (25% of total direct costs)		12,526	14,910	27,436
	CSUH Federal rate is 47% of salaries, wages & benefits.			
	The University will provide an additional match as unrecovered indirect costs.			
		REQUEST	**MATCH**	**TOTAL**
Total, Task 4		**62,628**	**32,021**	**94,650**
		REQUEST	**MATCH**	**TOTAL**
GRAND TOTAL, YEAR TWO		**499,530**	**104,351**	**603,881**
We propose that up to 10% of each item be allowed to be reallocated to another category if necessary, with no change in final cost contracted.				
*	*Operations and Maintenance budget item.*			

Proposed CALFED budget through CSUH Foundation. Year Three. Jan 1, 2003 - ~Dec , 2003.				
TASK 1 (required for any of project) Project Initiation, Supervision, and General Reporting.			**MATCH**	
Salaries		**REQUEST**	(from CSUH unless noted)	**TOTAL**
Chris Kitting	1/6 time x 2 Acad. qtr	10,957		10,957
($32,870/qtr)x3	Match: 1/12 time x 2 Acad. qtr		5,478	5,478
incl.SrFac.SalGap	0.3 time x Summer/overload/qtr breaks	9,861		9,861
John Rees	1/8 time max. x 12 months	12,548		12,548
($25,095/qtr)x4	or Associate			
Assistance	2 x $10~15/hr x 4 hr/wk x 44 weeks	4,576		4,576
Fringe Benefits				
Chris Kitting	Academic year release rate = 37%	4,054		4,054
	Academic year release rate = 37%		2,027	2,027
	Summer/overload rate = 10%	986		986
John Rees	Adjunct faculty rate = 10%	1,255		1,255
or Associate				
Assistance	Student benefit rate = 10%	458		458
Subtotal, Salaries, Wages and Benefits:		**44,694**	**7,505**	**52,199**
Other Direct Costs (Task 1)				
Travel expenses to CALFED and related meetings		1,800		1,800
General publication costs, including illustrations		1,500		1,500
Subtotal, Other Direct Costs, Task 1		***3,300***	***0***	***3,300***
Total Direct Costs, Task 1		47,994	2,027	55,499
Indirect Costs (25% of total direct costs)		11,998	12,535	24,533
CSUH negotiated Federal rate is 47% of salaries, wages & benefits.				
The University will provide an additional match as unrecovered indirect costs.				
		REQUEST	**MATCH**	**TOTAL**
Total, Task 1		**59,992**	**14,562**	**80,032**
TASK 2: Pilot and Major Marsh Community Restoration (and Extra Reporting)				
Salaries		**REQUEST**	**MATCH**	**TOTAL**
Chris Kitting	1/3 time x 1 Acad. qtr	10,240		10,240
($32,870/qtr)x3	Match: 1/6 time x 1 Acad. qtr		5,120	5,120
incl.SrFac.SalGap	0.3 time x Summer/overload/qtr breaks	9,216		9,216
	(throughout, as in article 36 of CSU contract)			
John Rees	1/5 time max. x 12 months	20,076		20,076
($25,095/qtr)x4	or Associate			
Student Asst.	2 x $10~15/hr x 6.5 hr/wk x 44 weeks	6,864		6,864
Technical Asst.	1 x $21/hr x 13 hr/wk x 44 weeks	12,012		12,012
Fringe Benefits				
Chris Kitting	Academic year release rate = 37%	3,789		3,789
	Academic year release rate = 37%		1,894	1,894
	Summer/overload rate = 10%	922		922

	John Rees	Adjunct faculty rate = 10%	2,008		2,008
	or Associate				
	Student Asst.	Student benefit rate = 10%	686		686
	Technical Asst.	Part-time benefit rate = 37%	4,444		4,444
Subtotal, Salaries, Wages and Benefits:			***70,257***	***7,014***	***77,271***
Other Direct Costs (Task 2)					
	Equipment and supplies		3,600		3,600
	Repairs		1,500		1,500
	Transportation Costs & boat use		2,000		2,000
*	Remote lab use ($700/mo x 4 mo)		2,800		2,800
	E.Bay Regional Pks (orCCMVC) permitting expenses-partial		8,000		8,000
	(for Delta shore restoration pilot, partial cost)				
*	Remote Lab expenses (communications, copies)		1,300		1,300
	Publication costs		1,500		1,500
Subtotal, Other Direct Costs			***20,700***		***20,700***
Total Direct Costs, Task 2			90,957	7,014	97,971
Indirect Costs (25% of total direct costs)			22,739	62,194	84,933
	CSUH Federal rate is 47% of salaries, wages & benefits.				
	The University will provide an additional match as unrecovered indirect costs.				
			REQUEST	**MATCH**	**TOTAL**
Total, Task 2			**113,696**	**69,208**	**182,905**
TASK 3: Physical and Biological Comparative Monitoring of Marsh Treatments					
(and Extra Reporting)					
Salaries			**REQUEST**	**MATCH**	**TOTAL**
	Chris Kitting	1/3 time x 3 Acad. qtr	30,720		30,720
	($32,870/qtr)x3	Match: 1/6 time x 3 Acad. qtr		20,480	20,480
	incl.SrFacSalGap	0.5 time x Summer/overload/qtr breaks	15,360		15,360
	John Rees	1/2 time max. x 12 months	50,190		50,190
	($25,095/qtr)x4	or Associate			
	Sam McGinnis	stipend @ previous rate+<10%gap	26,460		26,460
	(Professor Emeritus)	Contra Costa/ and Associate at SP Bay			
	Student Assist.	3 x ~$11/hr x 6.5 hr/wk x 44 weeks	9,438		9,438
	Lab Assist.	~$10/hr x 10 hr/wk x 44 weeks	4,400		4,400
Fringe Benefits					
	Chris Kitting	Academic year release rate = 37%	11,366		11,366
		Academic year release rate = 37%		7,578	7,578
		Summer/overload rate = 10%	1,536		1,536
	Sam McGinnis	Summer/overload rate = 10%	2,646		2,646
	/Associate				
	John Rees	Adjunct faculty rate = 10%	5,019		5,019
	or Associate				
	Student Assist.	Student benefit rate = 10%	944		944
	Technical Assist.	Part-time benefit rate = 37%	6,716		6,716

	Lab Assist.	Student benefit rate = 10%	440		440
Subtotal, Salaries, Wages and Benefits:			***165,234***	***28,058***	***193,292***
Other Direct Costs (Task 3)					
	Contra Costa Vegetation monitoring and management				
		(for CCMVC, incl staff @<$30 /hr)	40,425		40,425
	Tubbs Island Bird Monitoring (for SF Bay Wildlife Society/		18,150		18,150
	/Friends of San Pablo Bay, incl staff @ <~$22/hr)				
	Tubbs Island Vegetation Monitoring (for SF Bay Wildlife Society/		2,267	540	2,807
	/Friends of San Pablo Bay, incl staff @ $20-34/hr)				
	Field Equipment, replacement, supplies, repairs, and safety gear		3,400		3,400
	Transportation Costs		2,500		2,500
	Boat use, partial cost		4,000		4,000
*	Remote lab space ($700/mo x 6 mo), partial cost		4,200		4,200
*	Remote lab expenses (communication, copies, modifications)		4,300		4,300
	replacement/repair equipment		2,400		2,400
	Publication and illustration partial costs		1,900		1,900
Subtotal, Other Direct Costs			***83,542***	***540***	***84,082***
Total Direct Costs, Task 3			248,776	28,598	277,374
Indirect Costs (25% of total direct costs)			62,194	28,653	90,847
	CSUH Federal rate is 47% of salaries, wages & benefits.				
	The University will provide an additional match as unrecovered indirect costs.				
			REQUEST	**MATCH**	**TOTAL**
Total, Task 3			**310,970**	**57,251**	**368,222**
TASK 4: Chemical (N,K,C, toxic metals) Monitoring of Water, Sediments,					
	and Major Plants and Animals (and Extra Reporting)				
Salaries			**REQUEST**	**MATCH**	**TOTAL**
	Joy Andrews	1/6 time x 3 Acad. qtr	10,625		10,625
	($21,250/qtr)x3	Match: 1/6 time x 3 Acad. qtr		10,625	10,625
	John Rees	1/24 time x 12 months	4,183		4,183
	($25,095/qtr)x4	or Associate			
	Chris Kitting	1/6 time x 1 Acad. qtr	5,478		5,478
	($32,870/qtr)x3	Match: 1/12 time x 1 Acad. qtr		2,739	2,739
	incl.SrFacSalGap				
	Student Asst.	2 x $13/hr x 14 hr/wk x 44 weeks	16,016		16,016
Fringe Benefits					
	Joy Andrews	Academic year release rate = 37%	3,931		3,931
		Academic year release rate = 37%		3,931	3,931
	John Rees	Adjunct faculty rate = 10%	418		418
	or Associate				
	Chris Kitting	Academic year release rate = 37%	2,027		2,027
		Academic year release rate = 37%		1,013	1,013
	Student Asst.	Student benefit rate = 10%	1,602		1,602
Subtotal, Salaries, Wages and Benefits:			***44,280***	***18,309***	***62,589***
Other Direct Costs (Task 4)					
	carbon and nutrient analyzer supplies		4,800		4,800
*	Repairs and AA (metals analysis) supplies		2,500		2,500
	Transportation Costs/boat use		1,000		1,000
	Publication costs		1,400		1,400

Subtotal, Other Direct Costs	***9,700***		***9,700***
Total Direct Costs, Task 4	53,980	18,309	72,289
Indirect Costs (25% of total direct costs)	13,495	15,922	29,417
CSUH Federal rate is 47% of salaries, wages & benefits.			
The University will provide an additional match as unrecovered indirect costs.			
	REQUEST	**MATCH**	**TOTAL**
Total, Task 4	**67,475**	**34,231**	**101,706**
	REQUEST	**MATCH**	**TOTAL**
GRAND TOTAL, YEAR THREE	**492,141**	**160,690**	**652,832**
We propose that up to 10% of each item be allowed to be reallocated to another category if necessary, with no change in final cost contracted.			
* *Operations and Maintenance budget item.*			

SUMMARY OF Yrs 1+2+3					
Proposed CALFED budget through CSUH Foundation. Totals of Yrs One, Two, plus Three. Feb 1, 2001 - ~Dec, 2003.					
TASK 1 (required for any of project) Project Initiation, Supervision, and General Reporting.			**MATCH**		
Salaries		**REQUEST**	(from CSUH unless noted)	**TOTAL**	
Chris Kitting	1/6 time x 1 to 2 Acad. Qtr per yr	25,982		25,982	
	Match: 1/12 time x 1 to 2 Acad. Qtr per yr		12,991	12,991	
	>0.2 time x Summer/overload/qtr breaks	21,747		21,747	
John Rees	1/8 time max. x <12 months /yr	34,930		34,930	
	or Associate				
Assistance	2 x $10~15/hr x 4 hr/wk x 44 weeks /yr	13,376		13,376	
Fringe Benefits					
Chris Kitting	Academic year release rate = 37%	9,613		9,613	
	Academic year release rate = 37%		4,807	4,807	
	Summer/overload rate = 10%	2,175		2,175	
John Rees	Adjunct faculty rate = 10%	3,493		3,493	
or Associate					
Assistance	Student benefit rate = 10%	1,338		1,338	
Subtotal, Salaries, Wages and Benefits:		**112,653**	**17,797**	**130,450**	
Other Direct Costs (Task 1)					
Travel expenses to CALFED and related meetings		4,400		4,400	
General publication costs, including illustrations		4,200		4,200	
Subtotal, Other Direct Costs, Task 1		***8,600***	***0***	***8,600***	
Total Direct Costs, Task 1		121,253	4,807	139,050	
Indirect Costs (25% of total direct costs)		30,313	30,998	61,311	
CSUH negotiated Federal rate is 47% of salaries, wages & benefits.					
The University will provide an additional match as unrecovered indirect costs.					
		REQUEST	**MATCH**	**TOTAL**	
Total, Task 1		**151,566**	**35,805**	**200,361**	
TASK 2: Pilot and Major Marsh Community Restoration (and Extra Reporting)					
Salaries		**REQUEST**	**MATCH**	**TOTAL**	
Chris Kitting	~1/3 time x 2 Acad. Qtr per yr	39,620		39,620	
	Match: >1/6 time x 1 Acad. Qtr per yr		19,810	19,810	
incl.SrFac.SalC	~0.3 time x Summer/overload/qtr breaks	27,045		27,045	
	(throughout, as in article 36 of CSU contract)				
John Rees	>1/5 time max. x <12 months /yr	55,887		55,887	
	or Associate				
Student Asst.	2 x $10~15/hr x 6.5 hr/wk x 44 weeks /yr	20,592		20,592	
Technical Asst.	1 x $20/hr x 13 hr/wk x 44 weeks /yr	34,892		34,892	
Fringe Benefits					
Chris Kitting	Academic year release rate = 37%	14,660		14,660	
	Academic year release rate = 37%		7,329	7,329	

		Summer/overload rate = 10%	2,704		2,704
	John Rees	Adjunct faculty rate = 10%	5,589		5,589
	or Associate				
	Student Asst.	Student benefit rate = 10%	2,059		2,059
	Technical Asst.	Part-time benefit rate = 37%	12,910		12,910
Subtotal, Salaries, Wages and Benefits:			***215,959***	***27,139***	***243,098***
Other Direct Costs (Task 2)					
	Connecting Restored Channels to Ponds via wiers		0	$140,000 (CCMVC)	140,000 (CCMVC)
	Equipment and supplies		10,800		10,800
	Repairs		4,500		4,500
	Transportation Costs & boat use		6,000		6,000
*	Remote lab use ($700/mo x 4 mo)		8,400		8,400
	Plant and animal acquisition		16,000		16,000
	Plant salvage and transplant expenses, SPBNWR		9,775	$1,200 (SPBay)	10,975
	E.Bay Regional Pks (orCCMVC) permitting expenses-partia		49,000		23,000
	(for Delta shore restoration pilot, partial cost)				
*	Remote Lab expenses (communications, copies)		3,900		3,900
	Publication costs		2,160		2,160
Subtotal, Other Direct Costs			***110,535***	***141,200***	***251,735***
Total Direct Costs, Task 2			326,494	168,339	494,833
Indirect Costs (25% of total direct costs)			81,623	81,249	162,872
	CSUH Federal rate is 47% of salaries, wages & benefits.				
	The University will provide an additional match as unrecovered indirect costs.				
			REQUEST	**MATCH**	**TOTAL**
Total, Task 2			**408,117**	**249,588**	**657,705**
TASK 3: Physical and Biological Comparative Monitoring of Marsh Treatments (and Extra Reporting)					
Salaries			**REQUEST**	**MATCH**	**TOTAL**
	Chris Kitting	~1/3 time x 1 to 2 Acad. Qtr per yr	71,107		71,107
		Match: ~1/6 time x 1 to two Acad. Qtr /yr		45,793	45,793
	incl.SrFacSalG	~0.5 time x Summer/overload/qtr breaks	45,220		45,220
	John Rees	>1/3 time max. x 12 months per yr	125,809		125,809
		or Associate			
	Sam McGinnis	stipend @ previous rate+<10%gap	75,660		75,660
	(Professor Emeritus) Contra Costa/ and Associate at SP Bay				
	Tech Assist.	3 x ~$10/hr x 6.5 hr/wk x 44 weeks /yr	27,456		27,456
	Assist.	~$12/hr x 10 hr/wk x 44 weeks /yr	14,080		14,080
Fringe Benefits					
	Chris Kitting	Academic year release rate = 37%	26,309		26,309
		Academic year release rate = 37%		16,944	16,944
		Summer/overload rate = 10%	4,522		4,522
	Sam McGinnis	Summer/overload rate = 10%	7,566		7,566
	/Associate				
	John Rees	Adjunct faculty rate = 10%	12,581		12,581
	or Associate				

	Student Assist.	Student benefit rate = 10%	2,416		2,416
	Technical Assis	Part-time benefit rate = 37%	16,972		16,972
	Assist.	Student benefit rate = 10%	1,408		1,408
Subtotal, Salaries, Wages and Benefits:			***431,435***	***62,737***	***494,172***
Other Direct Costs (Task 3)					
	Contra Costa Vegetation monitoring and management				
		(for CCMVC, incl staff @<$26 /hr) +ea yr	114,425		35,500
	Tubbs Island Bird Monitoring (for SF Bay Wildlife Society/		45,870		45,870
	/Friends of San Pablo Bay, incl staff @ <$17/hr) +ea yr				
	Tubbs Island Vegetation Monitoring (for SF Bay Wildlife Soc		5,885	1,530	7,415
	/Friends of San Pablo Bay, incl staff @ $18-30/hr) +ea yr			(SPB NWR)	
	2 YSI underwater data loggers with O2 electrodes		6,000		6,000
	Field Equipment, replacement, supplies, repairs, and safety		10,200		10,200
	Transportation Costs		7,500		7,500
	Boat use, partial cost		14,000		14,000
*	Remote lab use ($700/mo x 4 mo), partial cost		12,600		12,600
*	Remote lab expenses (communication, copies, modification		12,100		12,100
	scanner and portable computer		2,400		2,400
	Publication and illustration partial costs		3,700		3,700
Subtotal, Other Direct Costs			***239,480***	***1,530***	***241,010***
Total Direct Costs, Task 3			670,915	64,267	735,182
Indirect Costs (25% of total direct costs)			167,729	64,532	232,261
	CSUH Federal rate is 47% of salaries, wages & benefits.				
	The University will provide an additional match as unrecovered indirect costs.				
			REQUEST	**MATCH**	**TOTAL**
Total, Task 3			**838,644**	**128,800**	**967,443**
TASK 4: Chemical (N,K,C, toxic metals) Monitoring of Water, Sediments,					
	and Major Plants and Animals (and Extra Reporting)				
Salaries			**REQUEST**	**MATCH**	**TOTAL**
	Joy Andrews	1/6 time x 3 Acad. Qtr per yr	30,012		30,012
		Match: 1/6 time x 3 Acad. qtr		30,012	30,012
	John Rees	~1/24 time x 11 months per yr	11,643		11,643
		or Associate			
	Chris Kitting	~1/6 time x 1 Acad. Qtr per yr	15,383		15,383
		Match: ~1/12 time x 1 Acad. Qtr /yr		7,692	7,692
	incl.SrFacSalGap				
	Student Asst.	2 x ~$11/hr x 14 hr/wk x 44 weeks	44,352		44,352
Fringe Benefits					
	Joy Andrews	Academic year release rate = 37%	11,104		11,104
		Academic year release rate = 37%		11,104	11,104
	John Rees	Adjunct faculty rate = 10%	1,164		1,164
	or Associate				
	Chris Kitting	Academic year release rate = 37%	5,692		5,692
		Academic year release rate = 37%		2,846	2,846
	Student Asst.	Student benefit rate = 10%	4,435		4,435
Subtotal, Salaries, Wages and Benefits:			***123,786***	***51,654***	***175,440***

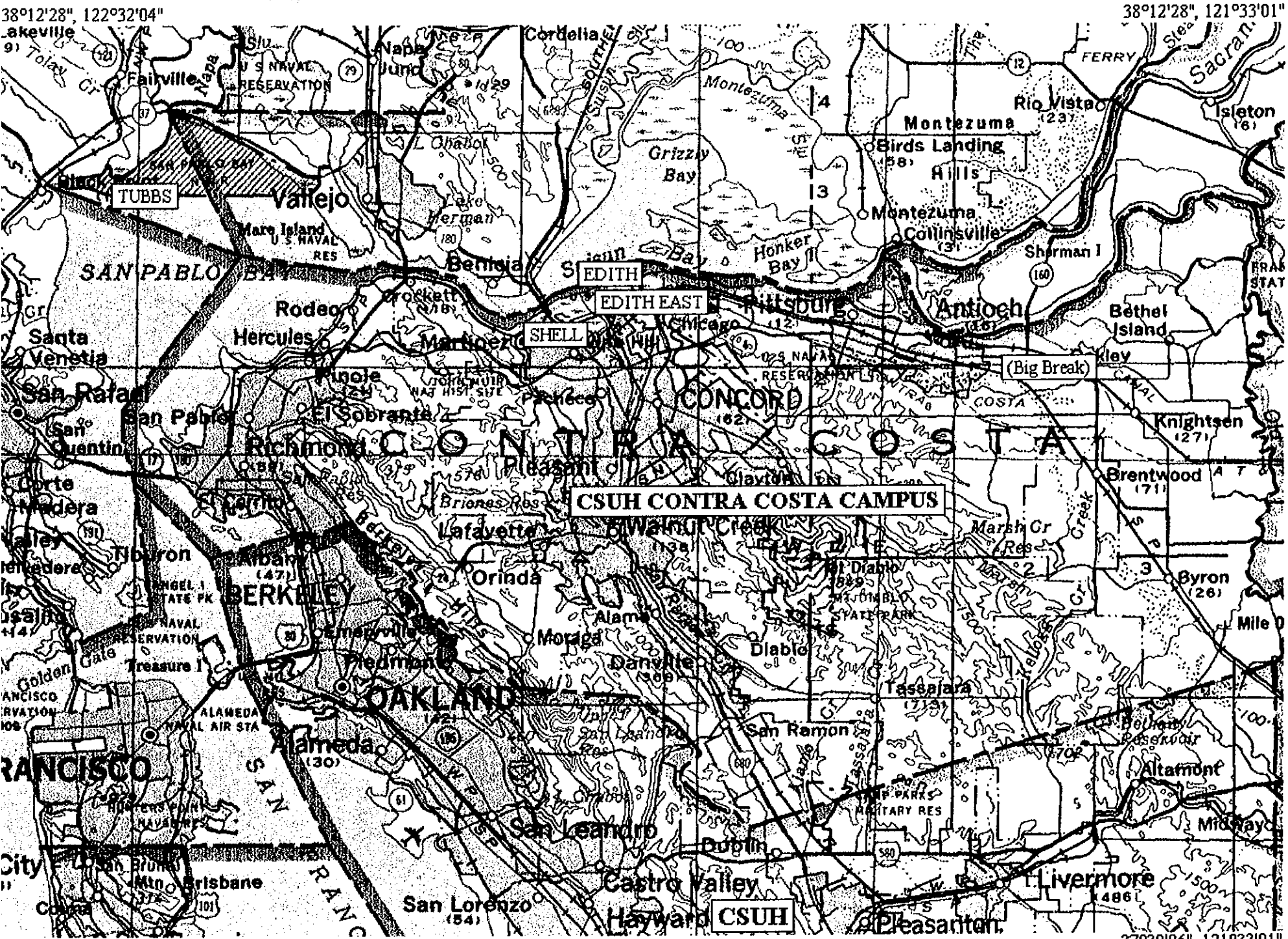
SUMMARY

Other Direct Costs (Task 4)				
	Hach carbon analyzer and supplies	15,400		15,400
*	Repairs and AA (metals analysis) supplies	9,500		9,500
	microwave digester (for metals analysis)	10,900	10,900	21,800
	Transportation Costs/boat use	3,000		3,000
	Publication costs	2,480		2,480
Subtotal, Other Direct Costs		***41,280***		***41,280***
Total Direct Costs, Task 4		***165,066***	***51,654***	***216,720***
Indirect Costs (25% of total direct costs)		41,267	41,190	82,457
	CSUH Federal rate is 47% of salaries, wages & benefits (47% x$252,060 = 118,468).			
	The University will provide an additional match as unrecovered indirect costs.			
		REQUEST	**MATCH**	**TOTAL**
Total, Task 4		**206,333**	**92,844**	**299,177**
	CSUH Federal indirect cost rate is 47% of salaries, wages & benefits (e.g. for total Yr 1, 47% x >$252,060 SWB = >$118,468).			
	Requested indirect costs = 25% of total direct costs (e.g. for total Yr 1, 25%x $370,467 TDC =$92,617)			
		REQUEST	**MATCH**	**TOTAL**
GRAND TOTAL, ENTIRE PROJECT $		**1,491,835**	**471,232**	**1,963,067**
We propose that up to 10% of each item be allowed to be reallocated to another category if necessary,				
with no change in final cost contracted.				
*	*Operations and Maintenance budget item.*			

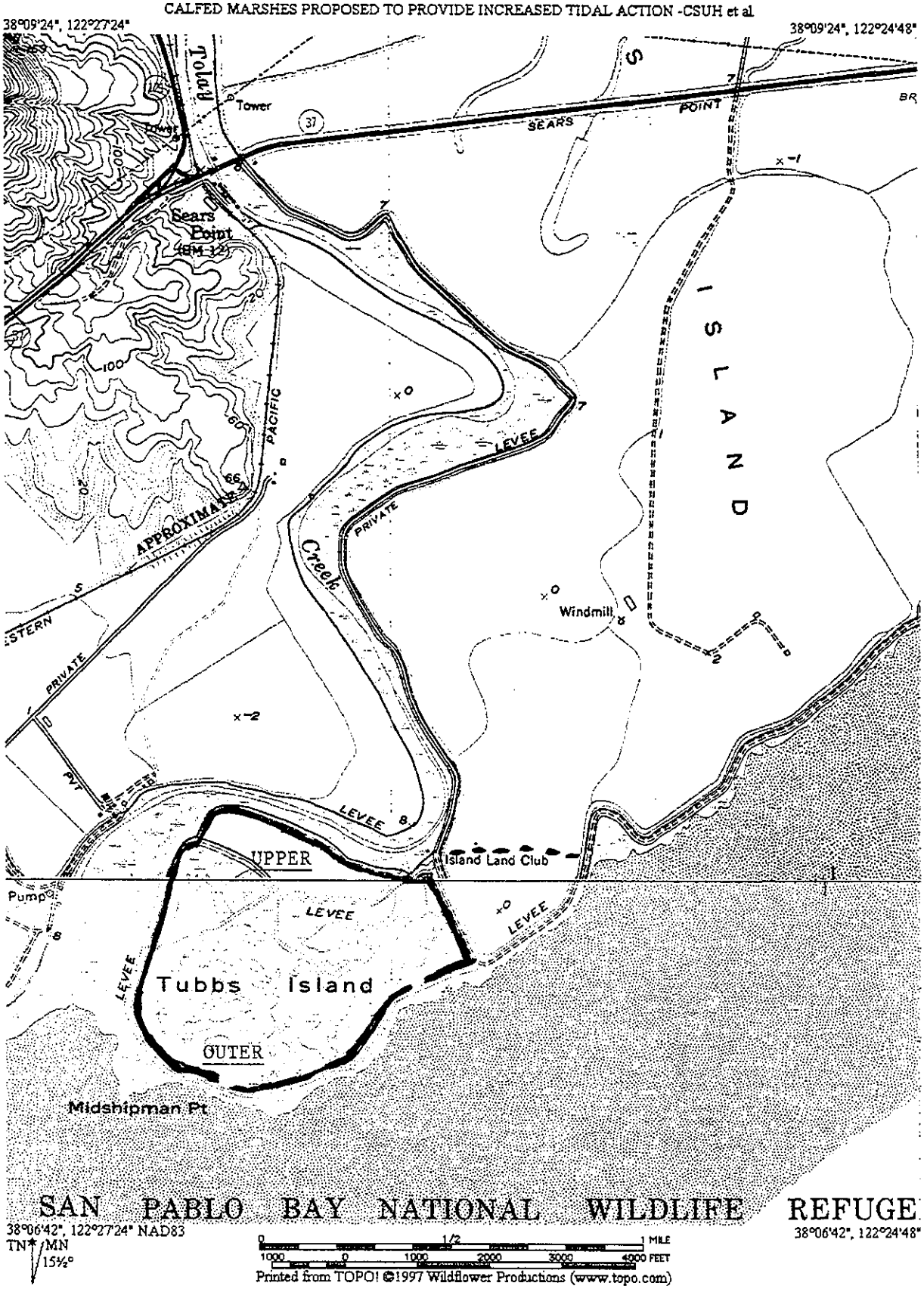
SITE	DATE	ST RAIN/FL	TIME	LAT/LONG	TIDE	20 DEPTH c	mpl DEPTH cr	CLARITY (cm)	TEMP C	WIND	ALT (pp	NDUCTIV	oreCon	02 ppr	pH	Sed trap?/Chem?/Other Physical P	initials
Up, Mid, or Down																	
Location																	
(veg or open)																	
eplicates down pg)																	
other																	
Up, Mid, or Down							in 0.25 m3 plankton		in 0.1m2 benthos:			and in fish traps and nets:					
Location	SITE	Date/Time	mpler SI	RATION (	depth/veg?		Crustacea spp	Other inverts			FISH SPP:					SONAR? photo fr#	
(veg or open)							(size class)				(size class)						
other																	

after budget: p.25

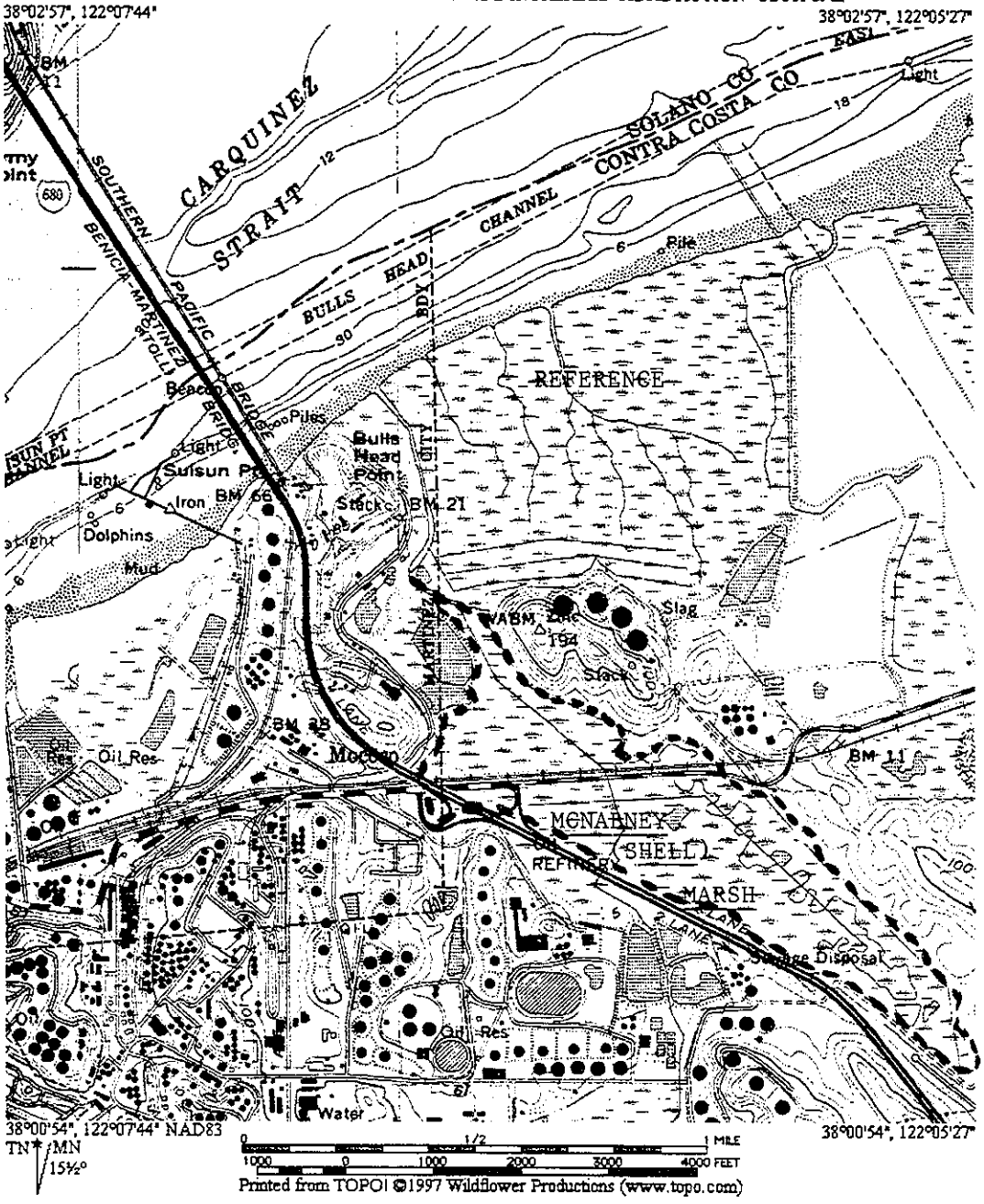
CALFED MARSHES PROPOSED TO PROVIDE INCREASED TIDAL ACTION -CSUH et al.



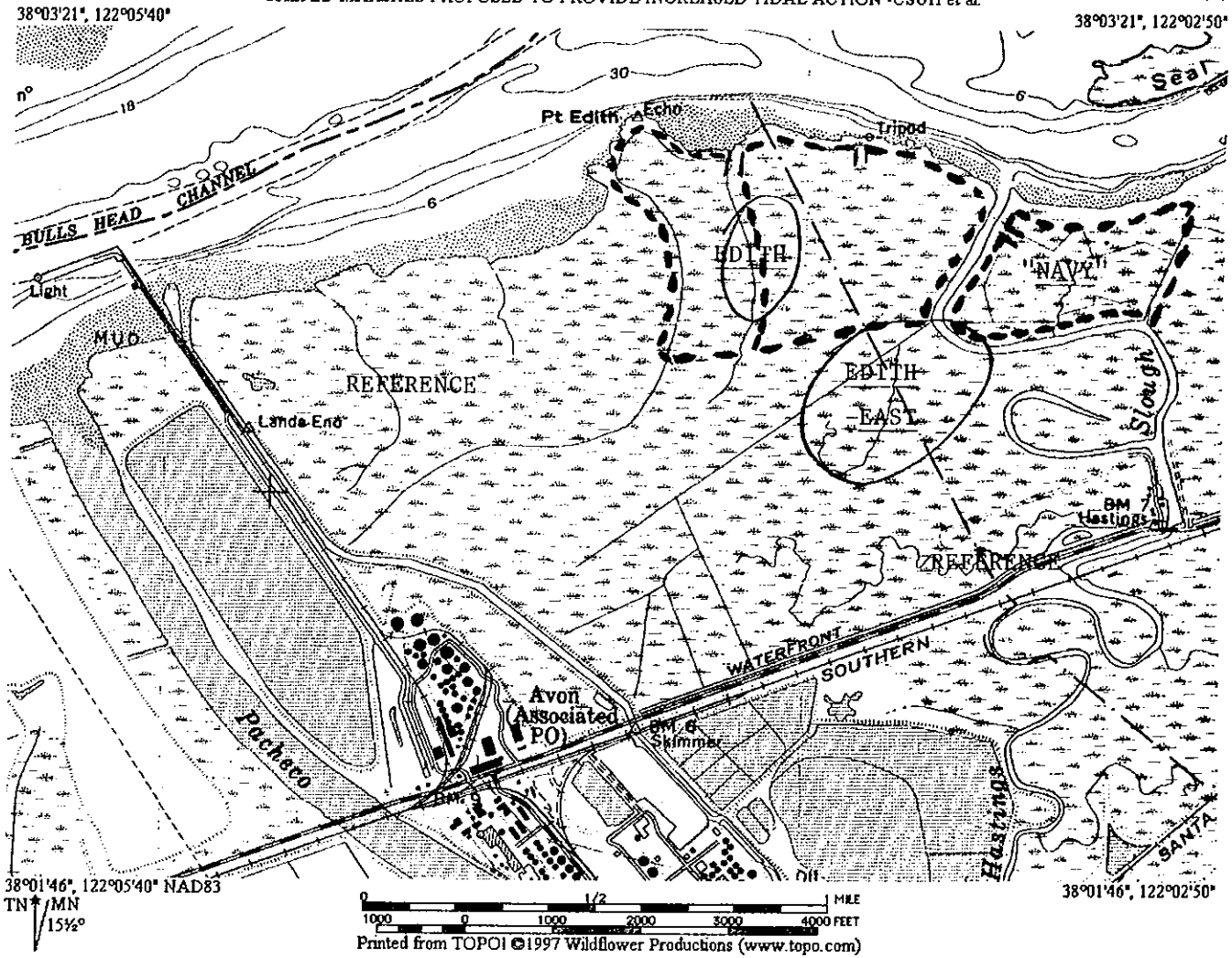
CALFED MARSHES PROPOSED TO PROVIDE INCREASED TIDAL ACTION -CSUH et al



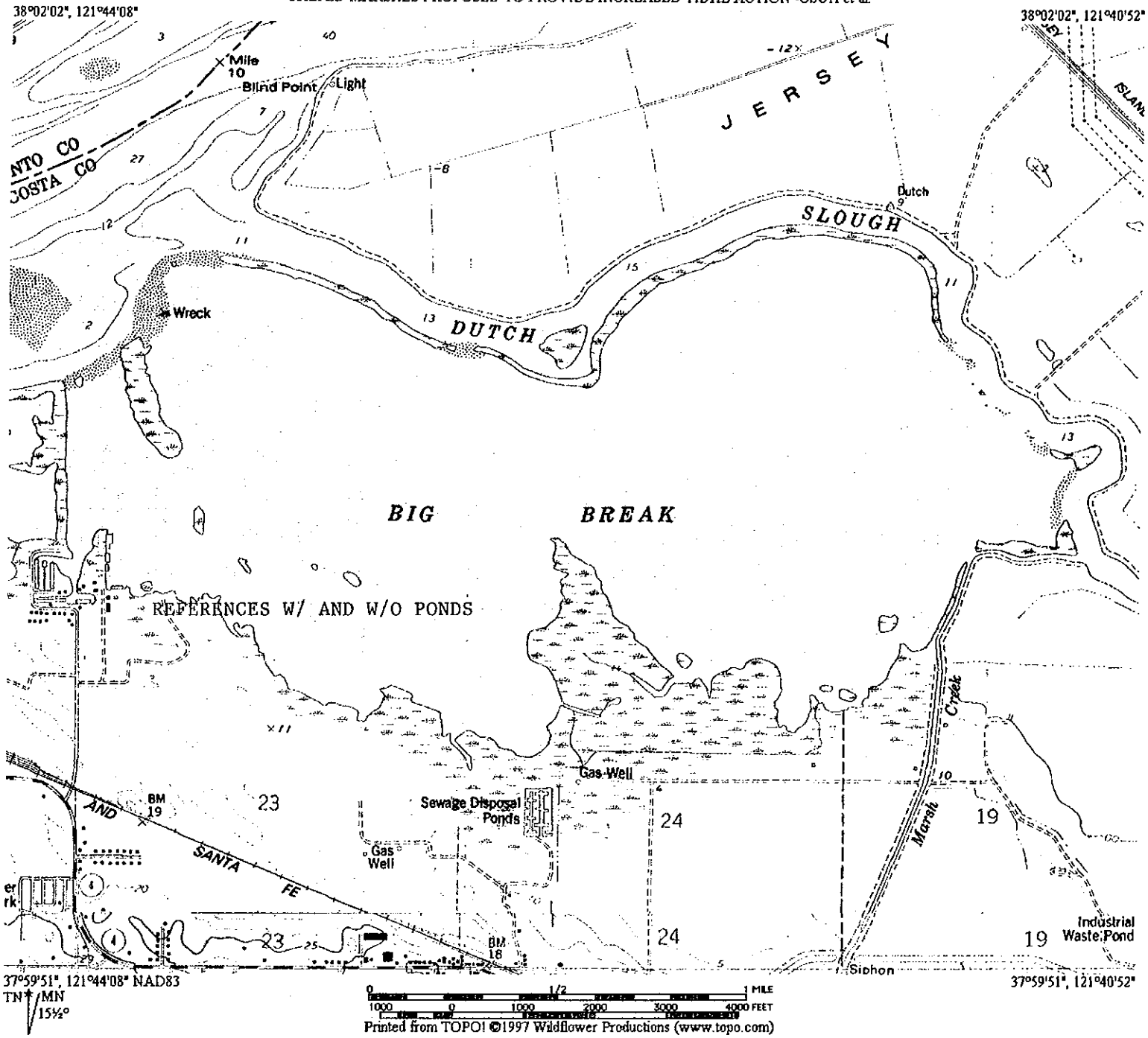
CALFED MARSHES PROPOSED TO PROVIDE INCREASED TIDAL ACTION -CSUH et al.



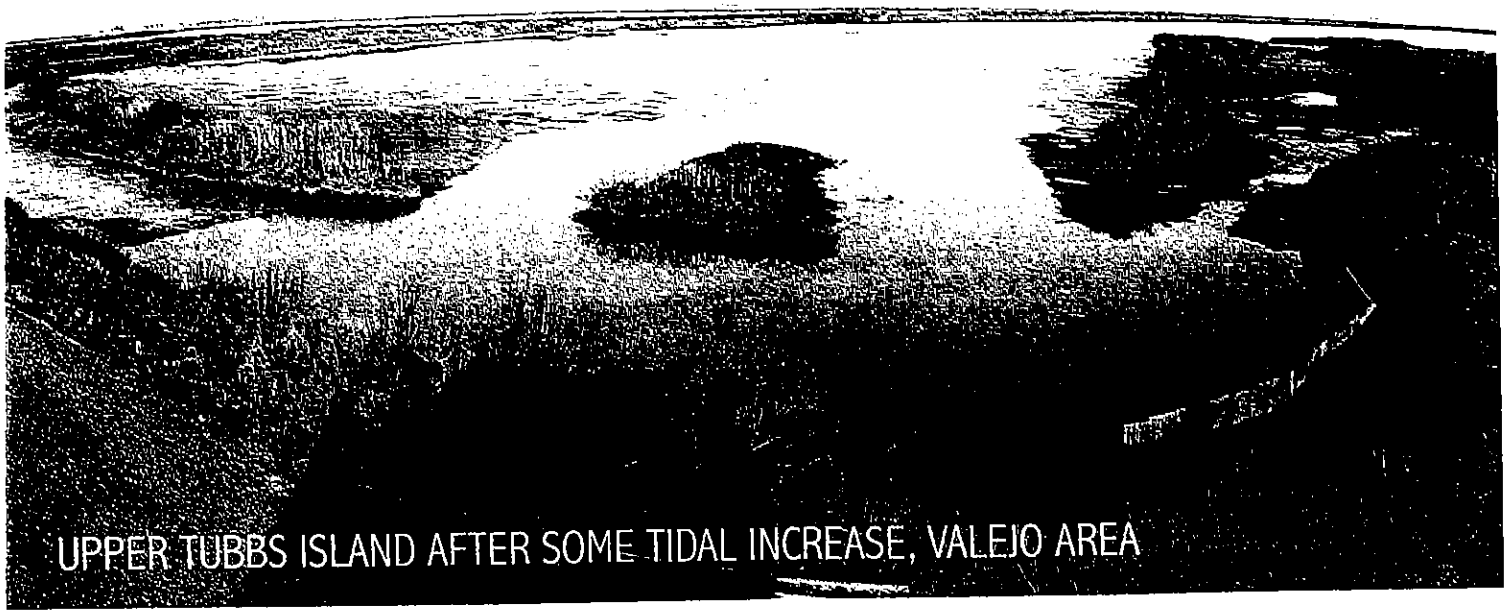
CALFED MARSHES PROPOSED TO PROVIDE INCREASED TIDAL ACTION -CSUH et al. Circles indicate new Pond Areas Proposed



CALFED MARSHES PROPOSED TO PROVIDE INCREASED TIDAL ACTION -CSUH et al.

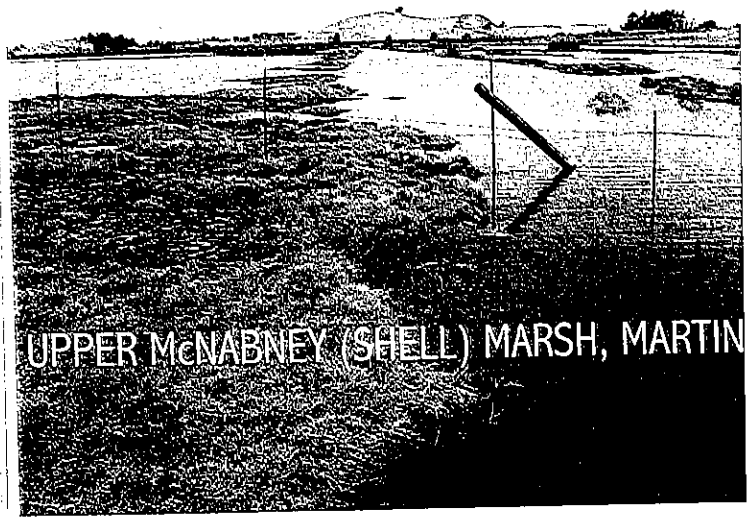


PROPOSED MAJOR CALFED SITES FOR PHASE 2, FROM WEST TO EAST: SAN PABLO AND SUISUN BAYS, THEN OUTER DELTA. PAIRED REFERENCE SITES NEAR EACH, AND SITES AT WEAPONS DETACHMENT, CONCORD, ARE NOT SHOWN. Also See Maps.

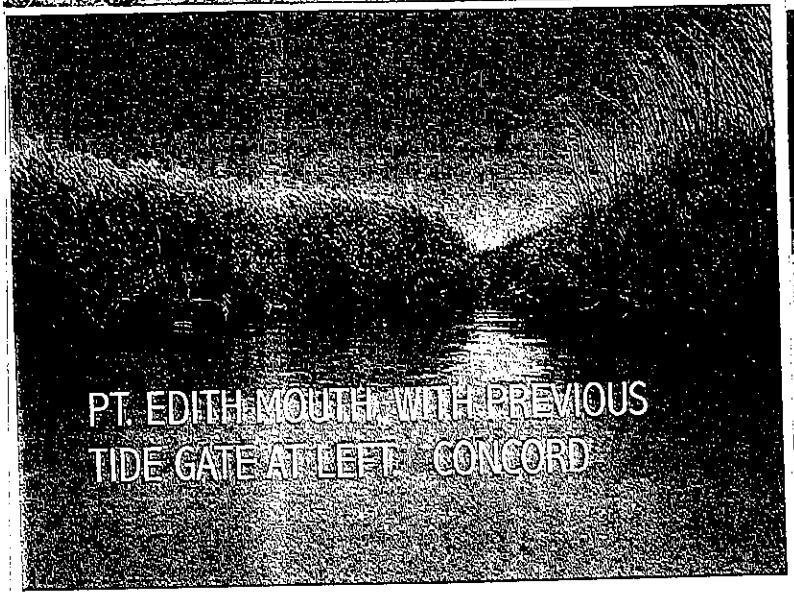


UPPER TUBBS ISLAND AFTER SOME TIDAL INCREASE, VALEJO AREA

TUBBS IS AFTER SOME TIDAL INCREASE, VALE



UPPER McNABNEY (SHELL) MARSH, MARTIN



PT. EDITH MOUTH, WITH PREVIOUS TIDE GATE AT LEFT. CONCORD

BIG BREAK (A REF AREA FOR NOW), ANTI

TABLE D-1: PROPOSAL SUBMITTAL REQUIREMENTS AND STANDARD CONTRACT CLAUSES

Item[1]	Standard Clauses and Proposal Requirements[2]	Services, Consulting, Preconstruction, Research, Land Acquisition (funded)					Public Works, Construction (donated)				
		State	Federal	Public	Non-profit	Private	State	Federal	Public	Non-profit	Private
PROPOSAL REQUIREMENTS											
19	Nondiscrimination Compliance			✓	✓	✓			✓	✓	✓
4021	Bidders Bond or other Security (if contract values > $107,000)[3]									✓	✓
4206	Non Collusion Affidavit								✓	✓	✓
n/a	Proof of Contractor's License									✓	✓
CONTRACT REQUIREMENTS											
4100	Contracts with Public Entities			✓					✓		
4099	Service & Consultant Service Contracts with Nonpublic Entity				✓	✓				✓	✓
4099a	Additional Standard Clauses		✓	✓	✓	✓		✓	✓	✓	✓
4187	Interagency Agreements	✓					✓				
4247	Contracts with United States		✓					✓			
4197	General Conditions for Public Works Contracts								✓	✓	✓
4196	Insurance Requirements								✓	✓	✓
18	Nondiscrimination Construction Contract Specifications								✓	✓	✓
807	Payment Bond								✓	✓	✓
156	Performance Bond								✓	✓	✓
n/a	Certificate of Insurance								✓	✓	✓

Legend: State = State of California agencies, including State (California) Universities.
Federal = Federal agencies.
Public = Public entities, such as city, county, other local government entities, resource conservation districts, and out-of-state public entities.
Private = For-profit and non-profit organizations, and individuals.

[1] Item numbering refers to documents following this table.
[2] All contract terms and standard clauses apply to any subcontacts made by Contractor.
[3] Types of security include cashiers check, cash, certified check, or bidder's bond in an amount equal to 10 percent of the proposed amount.

and Use Checklist

ll applicants must fill out this Land Use Checklist for their proposal. Applications must contain answers to the llowing questions to be responsive and to be considered for funding. *Failure to answer these questions and clude them with the application will result in the application being considered nonresponsive and not nsidered for funding.*

1. **Do the actions in the proposal involve physical changes to the land(i.e. grading, planting vegetation, or breeching levees) or restrictions in land use (i.e. conservation easement or placement of land in a wildlife refuge)?**

X
YES

NO

If NO to # 1, explain what type of actions are involved in the proposal (i.e., research only, planning only).

3. **If YES to # 1, what is the proposed land use change or restriction under the proposal?**

From minor tidal influence to moderate tidal influence.

4. **If YES to # 1, is the land currently under a Williamson Act contract?**

YES

X
NO

5. **If YES to # 1, answer the following:**

Current land use very muted marsh
Current zoning ~~Tubbs: agriculture.~~ Concord: open space
Current general plan designation ~~LEA 100, BR, F2,~~ 2

6. **If YES to #1, is the land classified as Prime Farmland, Farmland of Statewide Importance or Unique Farmland on the Department of Conservation Important Farmland Maps?**

YES

X
NO

DON'T KNOW

7. **If YES to # 1, how many acres of land will be subject to physical change or land use restrictions under the proposal?**

~~750 acres~~

8. **If YES to # 1, is the property currently being commercially farmed or grazed?**

YES

X
NO

9. **If YES to #8, what are**

the number of employees/acre_____
the total number of employees _____

6. **Please indicate what permits or other approvals may be required for the activities contained in your proposal. Check all boxes that apply.**

LOCAL		
Conditional use permit	___	
Variance	___	
Subdivision Map Act approval	___	
Grading permit	___	
General plan amendment	___	
Specific plan approval	___	
Rezone		___
Williamson Act Contract cancellation	___	
Other _____ (please specify)		
None required	___	
STATE		
CESA Compliance	X	**(CDFG)**
Streambed alteration permit	___	**(CDFG)**
CWA § 401 certification	OK	**(RWQCB)**
Coastal development permit	OK	**(Coastal Commission/BCDC)**
Reclamation Board approval	___	
Notification	___	**(DPC, BCDC)**
Other _____ (please specify)	___	
None required	___	
FEDERAL		
ESA Consultation	OK	**(USFWS)**
Rivers & Harbors Act permit	~~OK~~	**(ACOE)**
CWA § 404 permit	~~OK~~	**(ACOE)**
Other _____ (please specify)		
None required	___	

DPC = Delta Protection Commission
CWA = Clean Water Act
CESA = California Endangered Species Act
USFWS = U.S. Fish and Wildlife Service
ACOE = U.S. Army Corps of Engineers

ESA = Endangered Species Act
CDFG = California Department of Fish and Game
RWQCB = Regional Water Quality Control Board
BCDC= Bay Conservation and Development Comm.

10. **Will the applicant acquire any interest in land under the proposal (fee title or a conservation easement)?**

_____ **YES** X **NO**

11. **What entity/organization will hold the interest?** US F&W S (TUBBS), EBayPksDistr (Shell), State Lands (EDITH)

12. **If YES to # 10, answer the following:**

Total number of acres to be acquired under proposal _____
Number of acres to be acquired in fee _____
Number of acres to be subject to conservation easement _____

13. **For all proposals involving physical changes to the land or restriction in land use, describe what entity or organization will:**

manage the property USFWS (TUBBS), EBAYPKSDISTR (SHELL), CC MOSQ VEC CNTRL (EDTH)

provide operations and maintenance services ditto

conduct monitoring ditto, plus CSU HAYWARD

14. **For land acquisitions (fee title or easements), will existing water rights also be acquired?**

_____ **YES** _____ **NO**

15. **Does the applicant propose any modifications to the water right or change in the delivery of the water?**

_____ **YES** X **NO**

16. **If YES to # 15, describe** _____

(not required) 36

THE CALIFORNIA STATE UNIVERSITY

BAKERSFIELD • CHICO • DOMINGUEZ HILLS • FRESNO • FULLERTON • HAYWARD • HUMBOLDT • LONG BEACH • LOS ANGELES • MARITIME ACADEMY • MONTEREY BAY
NORTHRIDGE • POMONA • SACRAMENTO • SAN BERNARDINO • SAN DIEGO • SAN FRANCISCO • SAN JOSE • SAN LUIS OBISPO • SAN MARCOS • SONOMA • STANISLAUS

OFFICE OF THE CHANCELLOR

Risk Management
CSU Risk Pool

TELEPHONE: (310) 985-2790
TELEFAX: (310) 985-2793

April 3, 1996

THE CALIFORNIA STATE UNIVERSITY
PUBLIC LIABILITY, WORKERS' COMPENSATION, PROPERTY AND AUTOMOBILE LIABILITY SELF-INSURANCE PROGRAM

To whom it may concern:

The State of California has elected to be self-insured for its general liability, vehicle liability, workers' compensation and property exposures through an annual appropriation from the General Fund. As a State agency, the California State University, Office of the Chancellor, the Trustees, and its system of campuses are included in this self-insured program.

The office of Risk Management in the Chancellor's Office administers the general liability, property and workers' compensation programs. The State Office of Risk and Insurance Management administers the motor vehicle liability program.

Under this form of insurance, the State and its employees (as defined in Section 810.2 of the Government Code) are insured for any tort liability that may develop through carrying out official activities, including state official operations on non-state owned property. Should any claims arise by reason of such operations or under an official contract or license agreement, they should be referred to the State Board of Control, State of California, Tort Liability Section, 1515 K Street, Sacramento, CA 95814. Any claims regarding property are to be referred to the California State University, Risk Manager, 400 Golden Shore, Suite 210, Long Beach, CA 90802.

Please feel free to contact me if you have any questions.

Sincerely,

Charlene M. Minnick

Charlene M. Minnick
Systemwide Risk Manager

CMM:mtl

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

San Pablo Bay National Wildlife Refuge
P.O. Box 2012
Mare Island, CA 94690
707-562-3000

SPECIAL USE PERMIT

Station No. to be Credited / Permit No.: **11640 - 99103**

Date: January 20, 2000

Period of Use (inclusive)
From: January 1, 2000
To: December 31, 2000

Permittee Name
Chris Kitting, John Rees
Sam McGinnins, Joy Andrews
California State University Hayward

Permittee Address
Department of Biological Science
Hayward, CA
FAX 510:885-4747
PH 510-885-3001

Purpose (specify in detail privilege requested, or units of products involved)

Permittees and associated team of graduatue students will perform monitoring of wetland restoration site on Tubbs Island and the adjacent muted marsh on Lower Tubbs Island within San Pablo Bay NWR for monitoring of these sites before during and after restoration through intergrated mottoring. This is the second year of a three year grant.

Description (specify unit numbers; metes and bounds, or other recognizable designations)

Permittees and field assistants under direction of permittees are allowed access to Tubbs Island and lower Tubbs Island within San Pablo Bay Refuge to monitor along set transects. Sampling includes plankton, small fish, small mammals and physical properties, including collecton of plants for heavy metals. As proposed in CALFED proposal.

Permittees coordinate dates of access with Refuge.
Refuge gate keys have been issued to permittee

Amount of fee: $0 if not a fixed payment, specify rate and unit of charge:

- [x] Payment Exempt - Justification: research
- [ ] Full Payment
- [ ] Partial Payment - Balance of payments to be made as follows:

Record of Payments
N/A

Special Conditions
See attached page of conditions.

This permit is issued by the U.S. Fish and Wildlife Service and accepted by the undersigned, subject to the terms, covenants, obligations, and reservations, expressed or implied herein, and to the conditions and requirements appearing on the reverse side.

Permittee Signature
C. Z. Kitting S. McGinnis

Issuing Officer Signature and Title
Bryan R. Winton

Form 3-1383 (Rev. 9/81)

CONTRA COSTA MOSQUITO AND VECTOR CONTROL DISTRICT

155 MASON CIRCLE ■ CONCORD, CA 94520 ■ (510) 685-9301 ■ FAX: 685-0266

38

December 14, 1998

Ms. Holt Uribe-Larson
Concord Naval Weapons Station
10 Delta St.
Concord, CA 94520

SUBJECT: CNWS PASS FOR MOSQUITO DISTRICT CONTRACTORS AND CSU RESEARCH COLLABORATORS

Dear Ms. Uribe-Larson:

Please issue month passes to Ms. Laura Hanson and Mr. Klaus Mazura, who are working as consultants to the Contra Costa Mosquito & Vector Control District for a natural resources management study on the Station, undertaken in coordination with Mr. Paul Rankin of your staff. In addition, please issue month passes to Dr's Chris Kitting and John Rees of Cal State University - Hayward, who are collaborating on the study. All four will be collecting ecological data in the tide marsh sections of the base. They will not be working in the areas around the bunkers or ships unless accompanied by a member of our staff. All four are U.S. citizens, and have been instructed not to take cameras onto the base without prior written permission from the Commanding Officer. Their study is expected to run from December, 1998 through December, 2001.

Thank your for your help. If you have any questions, please call me at (510) 685-9301 x107.

Sincerely,

Karl Malamud-Roam
Wetlands Specialist

C:\MyFiles\Personnel\Laura Hanson\Navy Pass 2.wpd

EAST BAY REGIONAL PARKS PARK DISTRICT

May 12, 2000

Professor Christopher L. Kitting, Ph.D.
Director of Shore Lab, Department of Biological Sciences
California State University
Hayward, CA 94542

SUBJECT: CALFED ECOLOGICAL RESEARCH GRANT PROPOSAL

Dear Dr. Kitting:

On behalf of the East Bay Regional Park District (District), I am pleased to offer this letter in support of your efforts to obtain a CALFED Ecosystem Program grant for wetlands habitat research and monitoring in the California Delta. There is a practical need for basic (baseline) research and monitoring of wetlands in the area to determine limiting factors affecting productivity and habitat value for endangered and more common native wetlands dependent species.

As a landowner of several shoreline parklands between Martinez and Big Break, near Antioch, the District will benefit from your research and monitoring efforts which should be directly applicable to current (Bay Point Wetlands Enhancement Project) and future wetlands enhancement and restoration efforts (Big Break). We are currently undergoing development of a Land Use Plan (LUP) for the newest parkland site – the 1660 acre Big Break Regional Shoreline. The LUP will identify wetlands enhancement and restoration opportunities at this site and we encourage your research and monitoring to include efforts at this location. We will be pleased to grant you and your research assistant site access and a research permit to conduct your proposed baseline studies. At the appropriate time, please contact Ken Burger, Stewardship Manager, at 510/544-2341 to apply for the site access and research permit.

We are pleased to encourage your efforts to help apply university expertise to these practical ecological needs.

Sincerely,

Pat O'Brien
General Manager

2950 Peralta Oaks Court P.O. Box 5381 Oakland, CA 94605-0381
Tel. 510 635-0135 Fax 510 569-4319 TDD 510 633-0460 www.ebparks.org

Department of Biological Sciences
California State University
Hayward, California **94542** **(510) 885-3471** FAX (510) 885-4747

5/14/00

Dr. Karl Malamud-Roam, Contra Costa Mosquito and Vector Control

Louise Vicencio and Bryan Winton, San Pablo Bay National Wildlife Refuge

Ken Burger, East Bay Regional Park District

Steve Barbata, Delta Science Center

Dear Colleagues,

As you know, California State University, Hayward, has completed this CALFED Phase 2 application with your collaboration, for continued funding of ecological restorations and monitoring of marshes, in collaboration with Contra Costa Mosquito and Vector Control, and with San Pablo Bay National Wildlife Refuge, of the US Fish and Wildlife Service. A less formal collaborator would be East Bay Regional Park District, for comparative monitoring on the outer Delta.

We look forward to continuing with this phase of the work with you, to enhance natural resources along public shores, as described in the attached proposal, in CALFED's format. Unless you hear first, we will let you know the results of the reviews as soon as they are announced, probably in October, 2000. The contracting would begin thereafter, with the earliest start date of Phase two, in February 2001. The project would run through 2003, as you know.

The final proposal here, for your file, is called:
Biological Restoration Improvements and Monitoring in the Suisun Marsh/North San Francisco Bay Ecological Zone. Phase 2: Importance of ponds and other features along marsh channels.

Comments are welcome at any time, for future reference or for ongoing work. Thank you again for your interest in such work together.

Best wishes,

Christopher L. Kitting, Ph.D.
Professor, Principal Investigator
ckitting@csuhayward.edu

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5/14/00

Sonoma County Permit and Resource Management Office
2550 Ventura Avenue. Santa Rosa, CA 95403

Contra Costa County Community Development Department
Current Planning Division
North Wing, 4th Floor
Martinez, CA 94553

Delta Protection Commission
14215 River Rd. P.O Box 530
Walnut Grove, CA 95690

Bay Conservation and Development Commission
30 Van Ness Ave. Room 2011
San Francisco, CA 94102

Dear Colleagues,

As you may know, California State University, Hayward is applying to CALFED (Sacramento) for continued funding of ecological restorations and monitoring of marshes, in collaboration with Contra Costa Mosquito and Vector Control, and with San Pablo Bay National Wildlife Refuge, of the US Fish and Wildlife Service.

The work would continue to enhance natural resources along public shores, as described in the attached proposal, in CALFED's format. That agency requests that we applicants send a copy of the proposal to agencies such as yours, for your information. The project would run through 2003.

The final proposal here is called:
Biological Restoration Improvements and Monitoring in the Suisun Marsh/North San Francisco Bay Ecological Zone. Phase 2: Importance of ponds and other features along marsh channels.

Feel free to contact me if further information may be helpful to you.

Best wishes,

Christopher L. Kitting, Ph.D.
Professor, Principal Investigator
ckitting@csuhayward.edu